A STUDY of some points in the ANATOMY and PHYSIOLOGY of the UTERUS and OVARIES, in their bearings on a hitherto undescribed variety of POST-PARTUM SHOCK, and POST-PARTUM PAIN.

A THESIS

For the DEGREE of DOCTOR of MEDICINE

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by

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The subject of this paper has been suggested to me by the observation of some cases which I have had an opportunity of seeing in practice. All the cases presented phenomena somewhat difficult at first sight to explain. I have been unable after careful search to find a record of any similar cases, and so far as I can discover, their aetiology has hitherto been unrecognised. For this reason, therefore, and with a view to discussing the symptoms, and bringing forward an explanation as to their possible cause, I venture to write the following pages.

Shock, occurring either during labour, or immediately post-partum, has frequently been described as resulting from very severe and prolonged labours, inversion or rupture of the uterus, or has been confounded with the syncope produced by severe haemorrhage. But in my cases, none of these conditions were present to account for it, nor did there exist any of the other recognised causes which are known to produce a state of collapse at such times, so that some other cause must be looked for.

This cause I think is to be found in injuries which I believe were inflicted on the ovaries during the management of labour, and a consequent reflex irritation set up.

Before, however, discussing the cases, and the symptoms clinically and in detail, there are some points in the anatomical relationship of the puerperal uterus and ovaries which must be borne in mind, and which we shall now consider. I propose to show:- (1) that the ovaries in pregnancy and during labour are in such a position that they are liable to be injured, and (2) that injuries to the ovaries may produce alarming reflex manifestations.

I. POSITION OF THE UTERUS.

(a) Unimpregnated.

It is now clearly established that the uterus, in addition to its inclination forwards, and its usual deviation to the right side, is rotated on its longitudinal axis in the vast majority of cases, in such a way as to bring its left border forwards. This rotation which occurs in the unimpregnated condition, and which has been described by Rouget, Claudius, Krause, His, Lusk, Spiegelberg,

Martin and others, becomes much more marked in the pregnant condition. According to Dohrn, Spiegelberg, and Olshausen, this rotation is caused mainly by the pressure of the rectum during development, pressing on the left side. Pfannkuch quotes Thiersch who says that Müller's ducts often lie obliquely or perpendicularly to one another in embryonic sheep, and Dohrn says that in sheep, cattle, and human embryos, the left duct usually lies further forward than the right. Pfannkuch says "the inclination of the "fundus to the right with rotation of the left edge "forwards is a position which has already shown it-"self in foetal life, and as regards essentials is to "be traced back to the first development of the foetal "intestines." Spiegelberg thinks the weight of the uterus in the right lateral posture (which is the commoner) is another potent cause.

(b.) <u>During pregnancy</u> the rotation to the right on the longitudinal axis becomes still more evident, and according to Chaignot, Charpentier and others, is more marked during the last month. Schroeder, Stratz, Freund, Olshausen, and E.Martin have established this beyond the possibility of a doubt, and

Charpentier, Spiegelberg, Kölliker, Lusk, Rouget, Bayer, Küstner, Winter, Tarnier, Claudius, Croom, Krause, and others, all describe this marked rotation. Depaul remarks that in a pregnant uterus "Rotation is a fact which has been confirmed by numerous necropsies". Croom has noted in many cases that in pregnancy the anterior surface of the uterus looks to the right, so that the transverse axis of the fundus is in the right oblique diameter of the pelvis. Schroeder and Stratz in a frozen section made on the body of a woman in labour, at the beginning of the first stage, describe the uterus as deviating so much from the symmetrical position that its left border was turned forwards and downwards, its right border, backwards and upwards. Winter also describes a frozen section which he made, in which the pregnant uterus lay exactly in the middle line with its left edge forwards. In another section, which he made, the bowels were enormously distended with gas and he did not look for rotation.

In certain animals, the cow for instance, this uterine rotation is greatly exaggerated. Sometimes it takes place to such an extent as to twist the vagina secondarily upon itself and so create a

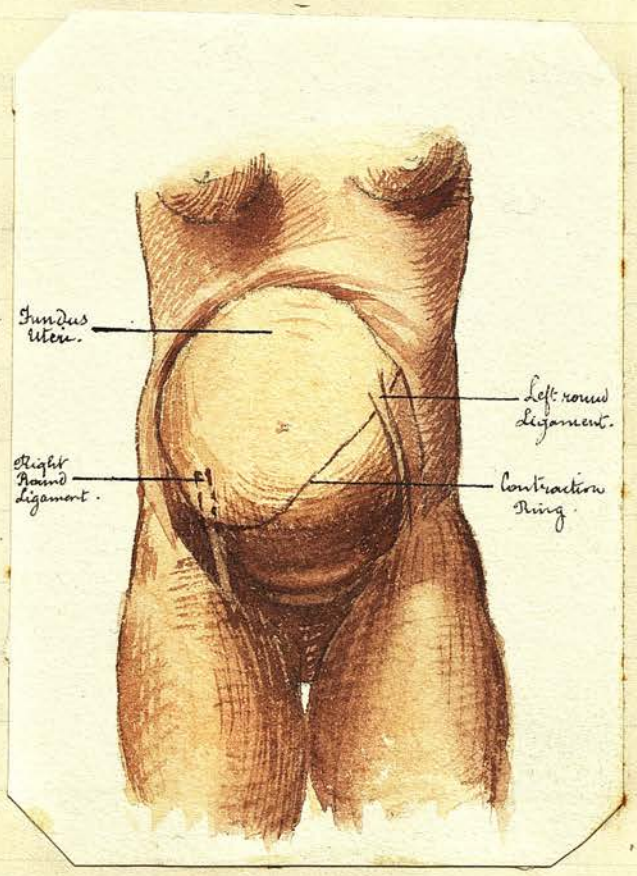
serious source of dystocia (Auvard, Charpentier). Dolèris, quoted by Charpentier, has observed a case where rotation was so great in a pregnant woman, that there were "phénomènes d'obstruction graves", during the labour. This was due to a semi-pathological condition, associated with abnormal relaxation of the pelvic tissues. The rotation in this case, strangely enough, was to the left.

A great many causes have been adduced to account for this rotation.

Spiegelberg thinks it depends mainly on an inherited tendency, but that it is increased by the small depth the abdominal cavity offers in the middle line, owing to the prominent spinal column, as well as by the force of gravity, in consequence of most pregnant women lying on their right side. E.Martin says, that often in Caesarian section where Lordosis was present, the uterus was so excessively rotated that its left border lay in the middle line anteriorly.

Schroeder and Stratz believe from clinical observation and frozen sections, that this rotation of the uterus in pregnancy is due to the position of the child in utero. That side of the uterus which

Plate I

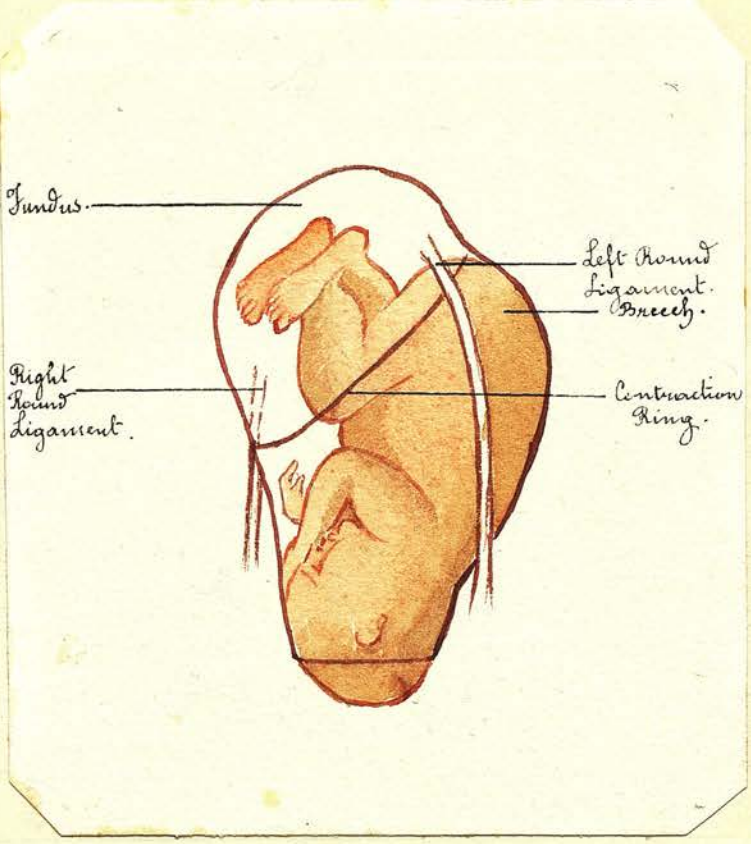


Normal position of the uterus in the first cranial position, the head in the pelvis.
(Schroeder and Stratz).

corresponds to the back of the child is always rotated forwards. They describe the breech as coming sideways out of the body of the uterus, the corresponding border of the uterus as turned forwards, and the corresponding Ligamentum Rotundum as being more tightly drawn, while the fundus sinks over to the opposite side. This they regard as the normal process. They further say:"If we regard the usual "first position of the head, which is so frequent, we "observe that while the ring of contraction moves "upwards upon the child, the fundus inclines somewhat "to the right,(i.e.) to the side of the abdomen of "the child. This is easy to recognise by the stronger "tension of the left round ligament, because it is "inserted higher than the right one. The left round "ligament is clearly to be felt somewhat to the left "of the median line, while the right is only to be "felt sideways with difficulty." In order to indicate more clearly their views on this subject, I have reproduced some of their diagrams.

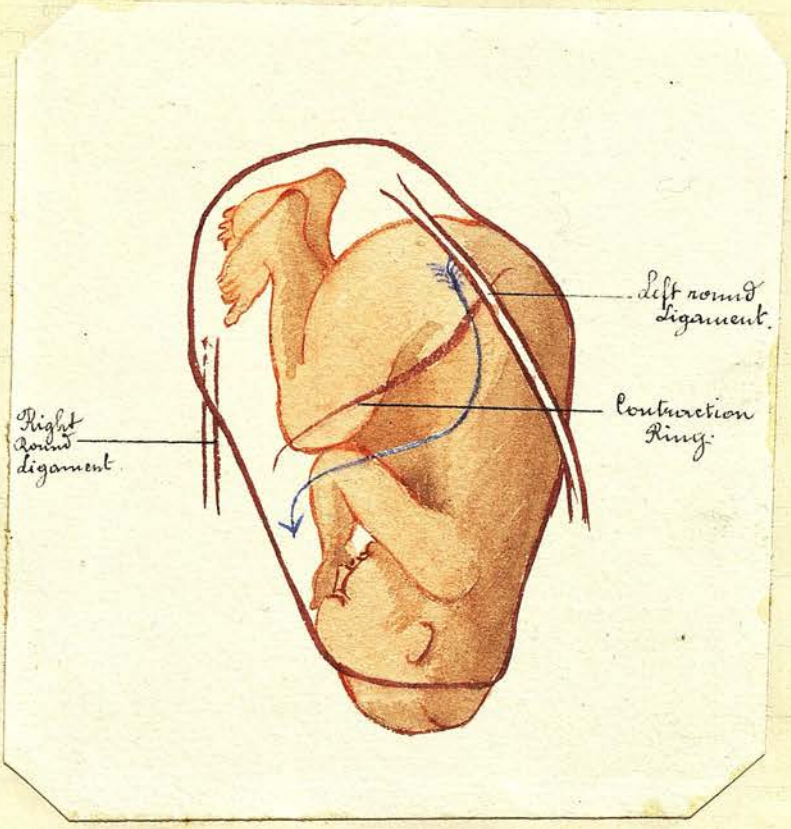
In observations of 120 head positions,they found that in 102, the ligamentum rotundum which corresponded to the back of the child was rotated

Plate II



Withdrawal of the breech from the fundus of the uterus, the head deeply placed in the first cranial position. The rotation of the uterus to the right is well shown.
(Schroeder and Stratz).

Plate III



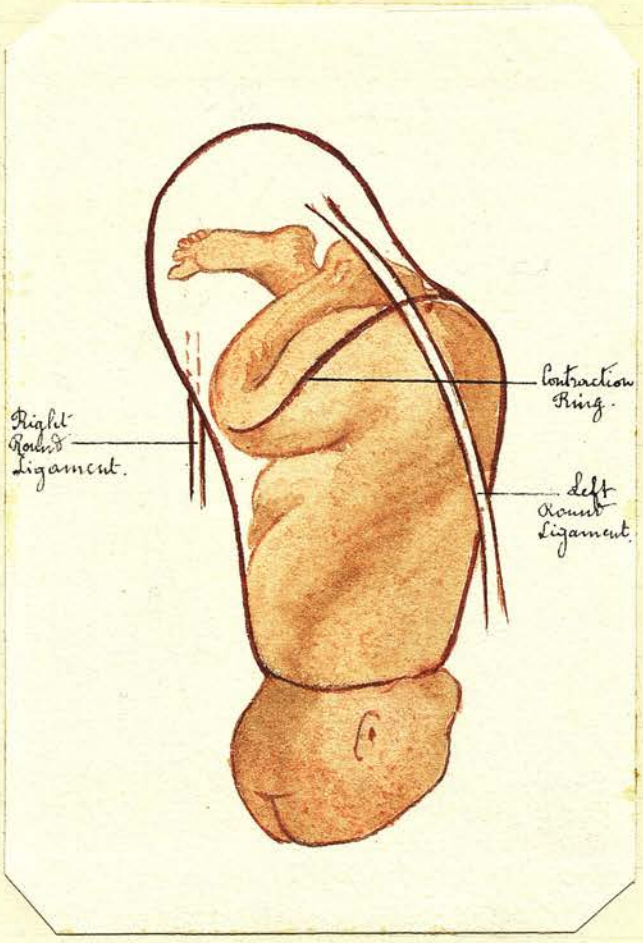
The revolution of the breech.

The arrow indicates the direction in which the breech moved.

Right rotation of the uterus.

(Schroeder and Stratz).

Plate IV



A case where the head rotated away from the axis of the breech, showing right rotation of the uterus.
(Schroeder and Stratz.)

forwards. In other 15 cases it turned forwards after the emptying of the bladder, and only in three cases was the tension of the round ligaments the same on both sides, and in these three cases the breech went straight out forwards, while the fundus sank backwards. In no single case could they observe that the round ligament corresponding to the abdomen lay forwards.

I cannot agree with Schroeder and Stratz in ascribing the rotation of the uterus to the position of the foetus in utero. I am inclined to agree with Spiegelberg's views so far, but I think there are other causes which deserve to be brought forward. The first is the relative shortness of the right broad ligament as compared with the left. The consequence of this is, that the left border of the uterus has the freer range of movement, the right border being more closely attached posteriorly, the left edge rotates forwards around this relatively fixed point. Another cause is the traction exercised by the round ligaments. An important point to be remembered (which has been pointed out by Joulin, Depaul, Tarnier and Chantreuil) is, that the insertions of the round ligaments and of the tubes are

found on the fully pregnant uterus nearly at the union of the anterior third with the posterior thirds of the organ. Stoltz has found that the round ligaments are quadrupled in size during pregnancy, and he finds that the right round ligament is shorter and thicker than the left. Schroeder and Stratz have proved that the left round ligament is inserted higher on the uterus than the right, and is therefore more tensely stretched. Homburger finds the left Ligamentum Rotundum usually more distinct and larger than the right, and that the right one is only to be felt rarely, when the uterus is rotated to the left. The more tensely stretched left round ligament will thus tend to increase rotation by pulling the left border of the uterus forwards. Another cause is one which I believe acts chiefly in the early months of pregnancy, and that is the asymmetry of the bladder when it is distended. The full bladder bulges to the right side; it will thus push back the right border of the uterus, and the loaded rectum will push forward the left border. These latter influences, as I have said, can only act on the pregnant uterus while it is yet a pelvic organ, but at any rate they will help to give it a

'set' in the direction I have indicated. When Resident Physician in the Royal Maternity Hospital here, I conducted a series of twenty observations on distended bladders in pregnancy, and found that in every case, a flexible bougie introduced into the bladder, passed distinctly to the right side, thus proving that the greatest distension of the bladder was in that direction.

Yet another cause of the rotation of the pregnant uterus is one which I consider to be a most potent one, and it is to be looked for in the disposition and arrangement of the middle layer of the muscular fibres of the uterus. These muscular fibres run obliquely in all directions, and it is impossible to conceive that their influence can be equal on both sides. The uterus in this respect may be compared to the heart. The heart is fixed at its base, at its junction with the aorta, and at every ventricular systole it rotates on its longitudinal axis to the right, so that the left ventricle comes more forward. The uterus is likewise fixed, partly by the ligaments in the pelvic cavity, partly by its insertion into the vagina. The fundus would

correspond to the apex of the heart. As the muscular fibres develop in pregnancy, they in all probability tend to increase the rotation to the right, by being brought into play <u>actively</u> in the intermittent uterine contractions which are known to exist all through pregnancy, and <u>passively</u> owing to the stretching which the uterine walls then undergo through the development of the foetus. To illustrate the effects of distension: take a fresh bladder, fix it below, and distend it moderately with water; we shall find that the bladder rotates on its longitudinal axis, and the greater the distension up to a certain point, the more marked will be the rotation. The same thing occurs in the uterus when its walls become distended by the rapid growth of its contents during pregnancy, the oblique muscular fibres being stretched, and passively helping to increase the rotation of the organ. I have only assumed, so far, that the arrangement of the muscular fibres in the uterus is such as to bring this about, but Auvard confirms the truth of my assumption by his theory that the development of the uterus is rarely perfectly symmetrical. He has shown in following the development of the pregnant uterus, that the

Plate V

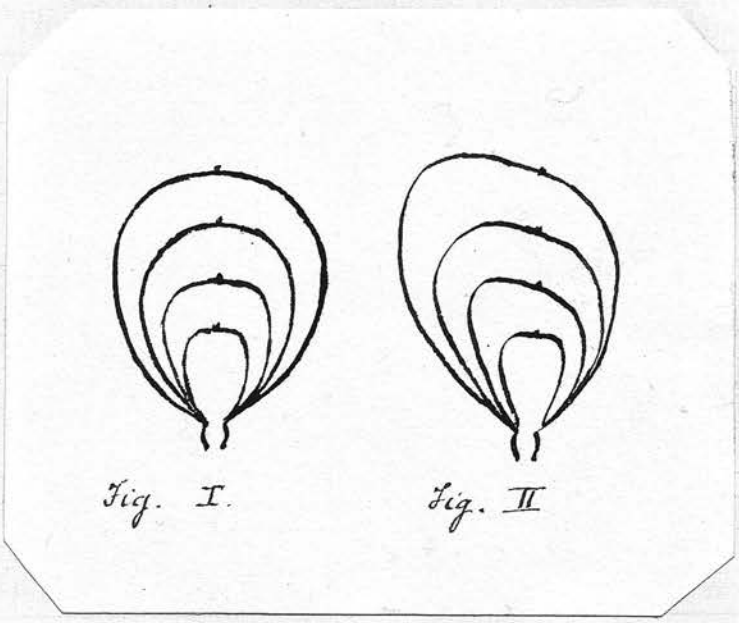


Fig. I. Fig. II

Fig. I. Median Uterus, symmetrical development of the two halves of the organ.

Fig. II. Apparent inclination of the Uterus, asymmetrical development of the two halves of the organ.

(Auvard.)

symmetrical development of the two halves of the organ produced a uterus which seemed median, while the asymmetrical development seemed to give a right or left inclination as the case may be. The right development is by far the most common, and any real deviation is simply secondary to that due to greater development. The anterior surface of the uterus is usually inclined towards the side on which the organ is most developed. In this way the more voluminous horn seems to draw after it the corresponding side of the gestating organ back towards the vertebral column, withdrawing the broad ligament from the same side of the abdominal wall, and acting conversely on the other broad ligament.

This explains clearly why rotation becomes more marked during labour and in the early puerperium, the muscular fibres being then in a state of great activity.

The unequal development of different parts of the uterus in pregnancy, is further confirmed by Joulin, who says that the increase during the first months is chiefly in the direction of the transverse and antero-posterior diameters, and by Tarnier

and Chantreuil, who state that the fundus of the organ increases considerably during the first six months, and the lateral parts follow this increase unequally. The inferior part develops chiefly during the three last months, and is usually more dilated anteriorly than posteriorly, the posterior part of the body being that which develops most in the upper two thirds.

Frequency of Right lateral Rotation of the uterus, and its relation to the Position of the Child.

Instead of ascribing the rotation of the uterus to the position of the child, as do Schroeder and Stratz, I believe with Lusk, Spiegelberg and E.Martin, that the position of the child is probably influenced by the rotation of the uterus. Bayer is of opinion that, owing to the traction exercised by, and the kind of hypertrophy of, the muscular fibres, the shape and appearance of the uterus are much influenced in the later months of pregnancy by the growth of the foetus. This can only be so, however, in the later months. I am far from doubting the accuracy of Schroeder's and Stratz's observations, for I believe they are correct in every detail. I have reproduced some of their diagrams, and am convinced that they

correctly represent the usual state of matters. In their theory as to the production of the rotation, however, they confound cause with effect, for it is not the position of the foetus in utero which causes the rotation, but it is the rotation which, to a great extent, influences the position. It is possible, that the foetus during the last month of pregnancy, may help by its position to increase the already existing rotation, and so make it more marked. We are able therefore to ascertain approximately the frequency of the occurrence of right lateral rotation of the uterus, by considering the position of the child which is so much influenced by the rotation. We argue from the effect caused, to the cause itself. If we allow that the position of the child is caused by the rotation, then the demonstration of the frequency of the occurrence of the position will give the frequency of occurrence of the rotation. When the uterus is rotated on its longitudinal axis to the right, the transverse axis of the uterus lies diagonally in the pelvis in the right oblique diameter. This, to a great extent, accounts for the fact, that, in cranial presentations, (which constitute fully 95 per cent of all labours) the

vertex of the foetal head lies in 99 per cent in the right oblique diameter of the pelvis. According to Spiegelberg, the back of the child in vertex presentations is directed to the left and forwards, in 70 per cent of cases, and to the right in 30 per cent. When it is directed to the right, it is most usually inclined backwards. Although Schroeder and Stratz argue erroneously from their premisses, and confound cause with effect, yet their statistics are sufficiently reliable to be accepted with confidence. They found that out of 120 head presentations which they examined, the uterus was rotated in 117, in other words in 97.6 per cent. They do not definitely state whether rotation was right or left, but say that the border of the uterus corresponding to the foetal back was always turned forwards. Counting only, (by general statistics) those cases where the back was forward and to the left, this would give 84 left occipito anterior positions out of those 120 cases as the very lowest computation, in other words, Spiegelberg's 70 per cent. But from my own observations I am distinctly of opinion that right lateral rotation of the uterus also occurs in

right occipito posterior positions, though perhaps not quite so constantly as in left occipito anterior cases. Such being the case, the percentage of cases of right lateral rotation in vertex presentations alone, would in all probability be nearer 90 than 70.

Chaignot has carefully investigated thirty cases, with the following results : -

21 were O.L.A.	with Right rotation	=	70 %
1 was O.L.A.	" no rotation	=	3.4 %
3 were O.D.P.	" right rotation	=	10 %
3 " "	" left rotation	=	10 %
2 " "	" no rotation	=	6.6 %

That is to say, in 80 per cent there was distinct right rotation, in 10 per cent there was left rotation, and in 10 per cent there was no appreciable rotation at all.

There were 22 Primary	O.L.A. cases	=	73.4 %
" " 8 "	O.D.P. "	=	26.6 %

The vertex lay in the right oblique diameter of the pelvis in every case to begin with; one changed to O.L.P. at the beginning of labour. Chaignot's cases will be more fully considered afterwards.

We are, I think, therefore justified in concluding from the foregoing statements, that in vertex cases the uterus is rotated to the right on its

longitudinal axis in at least 80 per cent of cases, probably more. Breech and face cases also present most commonly in the right oblique diameter of the pelvis, and from this circumstance, we may in like manner reasonably conclude, that the transverse axis of the uterus in the majority of these presentations also occupies the right oblique diameter of the pelvis. I have on two occasions been able to verify these statements at Post Mortem examinations. In both cases the long axis of the vertex was lying in the right oblique diameter of the pelvis, and the foetal back lay forwards and to the left. Both uteri were distinctly rotated to the right, and their left borders came forward.

Barbour in the "Anatomy of Labour" gives a most interesting indirect proof of what I have been contending for. He incidentally shows, in describing a section which he made of a patient who had died in the first stage of labour, that the transverse axis of the uterus was tending to lie in the left oblique diameter of the pelvis, in other words that it was rotated to the left. The vertex of the foetal head was also lying in the left oblique diameter

Plate VI.

Section of a pelvis containing a two months' pregnant Uterus, where, owing to the Dorsal position of the corpse and post-mortem changes, the Uterus fell backwards by its own weight. Thus, instead of the anteflexion usual at this period in life, post-mortem retroflexion was induced. (From a frozen section by Braune)

of the pelvis. This observation is too striking to be a mere coincidence, and it goes further to strengthen the theory that the rotation of the uterus is a most potent factor in determining the position of the child.

Charpentier says that rotation of the uterus to the right always occurs in pregnancy, and agrees with Spiegelberg in stating that the position of the foetal head, face and breech, depends upon the conformity of the uterus to the pelvis. Tarnier and Chantreuil also coincide in this opinion.

(c) Position of the uterus in the third stage of labour, and immediately post-partum.

It is to be particularly noted that, in examining post-partum uteri in an ordinary post-mortem examination, they will be found to have fallen backwards in most cases, owing to the relaxation of the muscles, and the emptying of the vessels, in conjunction with the dorsal decubitus of the body. (See Braune's plate). To obtain an accurate idea of the position of the uterus, the corpse must be carefully frozen before a section is made, otherwise the observation will be unreliable.

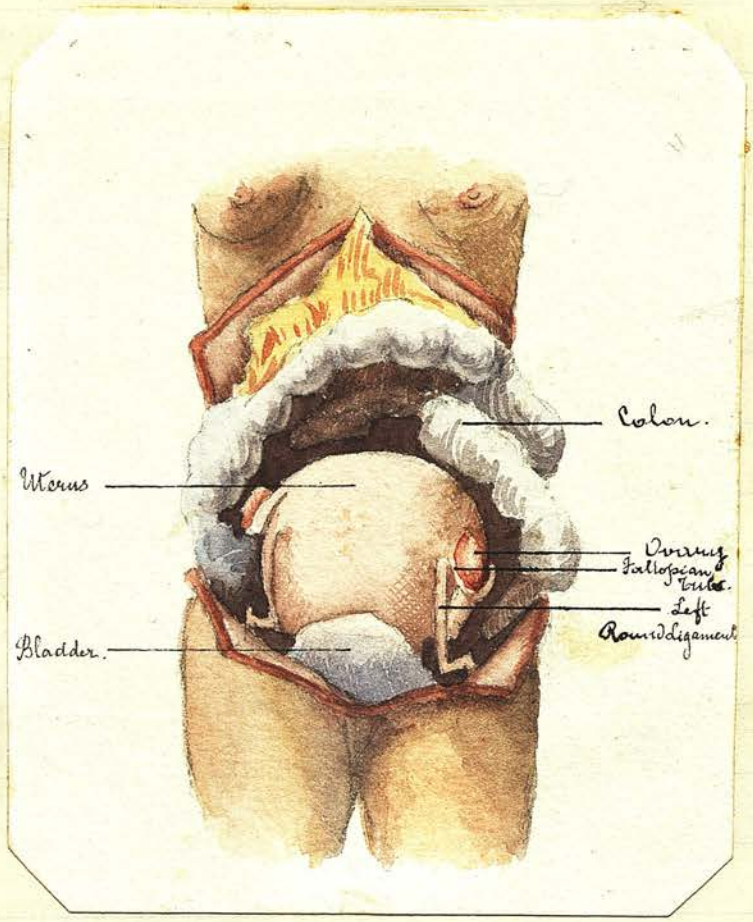
Owing to the large size of the uterus and the extreme laxness of the abdominal walls in the early days of the puerperium, its position can usually be satisfactorily ascertained clinically after careful examination. As to rotation, it can be observed better clinically than after death, for gravitation tends to undo rotation post-mortem, and even frozen sections are not quite accurate.

Rotation is to a great extent a vital property of the uterus, and tends to disappear after death, when muscular contraction ceases. Fritsch believes that it is only possible to make out the position of the uterus satisfactorily by clinical examination. He places no faith in post-mortem sections. This however seems an extreme view of the case.

Schroeder and Stratz, in a frozen section which they made through the body of a woman who had just been delivered, found that the uterus was fully a handbreadth above the umbilicus, and had sunk with the fundus towards the right. They describe the uterus as being twisted with its left border forwards.

A priori we should expect that the post-partum uterus would continue to maintain the same rotation on its longitudinal axis which it had

Plate VII.

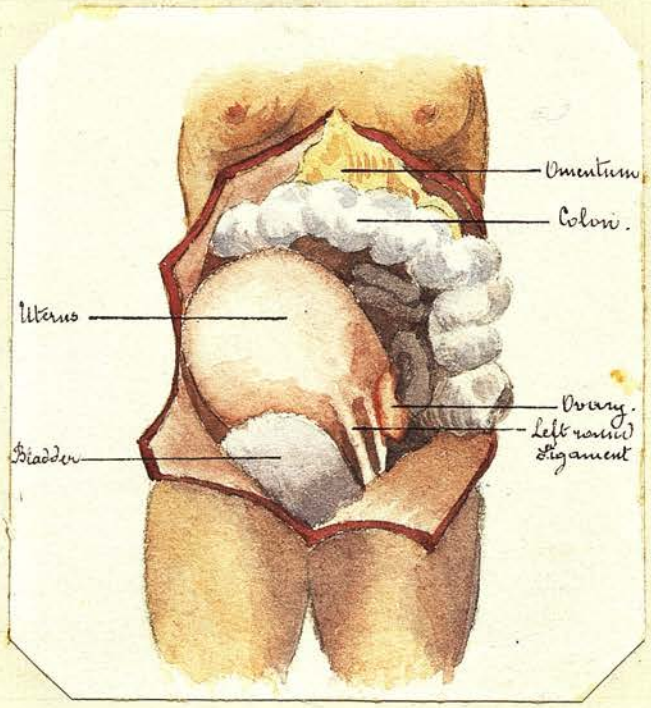


The uterus six hours post-partum.
From a Section.
(Schroeder and Stratz).

during pregnancy, and this as a matter of fact is the case. Rotation is, I think, more marked in the third stage than even immediately post-partum, owing to the stronger muscular contractions. Schroeder and Stratz have found, that both in the third stage, and in the puerperium, rotation can be clearly observed.

The puerperal uterus, after complete delivery, usually gives an approximate and diminished representation of the uterus before delivery, and the puerperal uterus is but an accentuated reproduction of its primitive form. The fundus of the post-partum uterus seldom lies mesially. It usually inclines to the right side; (1) because it has a natural lie in that direction; (2) owing to some extent to the influence of the rectum, and (3) from the accident of position. If the bladder be distended, the fundus is thrown to the left. Schroeder and Stratz believe that the fundus uteri generally falls over to the side to which it has drawn itself back over the child's breech, (i.e.) "in the first position to "the right, in the second position to the left. " Also the border corresponding to the child's back

Plate. VIII.



The Uterus four days after delivery.
From a Section.
(Schroeder and Stratz).

"is rotated forwards - in the first position it
" would be the left border, in the second position
"the right border." In 150 cases which they observed in the third stage, and immediately post-partum, the uterus only occupied the middle line four times, without rotation on its long axis. One of these cases was after the birth of twins, with two large equally developed children. In the other three the breech went straight out of the uterus forwards. In all the other cases the fundus uteri, after the birth of the child, lay to the right, with that border to the front which had corresponded to the back of the child. Spiegelberg says that immediately after labour the uterus is usually in the median line, but now and then inclines to the right, more rarely to the left side, and as a rule, is twisted to the right round its axis. When the bladder is full, it forces the uterus away from the abdominal wall and straightens it. At the same time, it pushes it to one side, and thereby increases its rotation round its longitudinal axis. Spiegelberg inclines to think that the distended bladder usually pushes the uterus to the right, but Croom has shown that it generally pushes it to the left. Croom has found

from clinical observation, that in many cases the puerperal uterus is rotated round its central axis, so that in fact, the transverse axis of the uterus no longer corresponds to the transverse diameter of the pelvis. One side of the uterus is thrown forwards, with the result that its transverse axis corresponds to the oblique diameter of the pelvis. Out of 40 cases which he noted, 10 shewed distinct rotation to the right. His observations were made on uteri which had already begun to involute, and where in all probability the altered state of contraction of the round ligaments, and the commencing degeneration of the muscular fibres of the uterus, had modified their original position.

Börner and Pfannkuch have both investigated the rotation of the puerperal uterus. Börner out of 64 post-partum cases which he observed, relates that in 50, rotation was entirely absent, in 12 the rotation was to the right, and in 2 to the left. His observations however, as he himself admits, must not be taken as contradicting the usually accepted ideas, and I am inclined to think, after carefully reading his arguments, that the results he has

arrived at are not sufficiently supported to be of any great weight. He thinks that after involution has set in, the uterus is too soft and flabby to be acted upon by the forces which formerly influenced it, and any special position it may take up during that time, is purely accidental.

Pfannkuch has observed, that when the bladder is full, right rotation of the uterus is increased, and Croom has noticed, that in cases where the rotation was absent, or only slight, when the bladder was empty, it was well marked when the bladder was distended. The bladder usually bulges more to the right side in consequence of its asymmetry, and when it becomes distended, it encroaches more on the right side, and thus helps to increase the rotation of the uterus. The post-partum uterus is, on account of its size, very easily influenced by bladder distension. The distension of the bladder by no means causes the rotation of the uterus, it simply increases the already existing rotation.

It is often a difficult thing in the third stage of labour, and immediately post-partum, to tell clinically which is the anterior and which is the posterior surface of the uterus, as, on account of

its then having a somewhat spherical shape, there is often not much antero-posterior flattening. In such cases the palpation of the ovaries will be our guide to its position. Their relations to the puerperal uterus we shall immediately consider. The round ligaments can also be felt in most cases. Chaignot says: "the old lateral borders and angles "of the uterus are only marked in the puerperal con- "dition, by the different parts of the appendages "which are fixed to them".

I have myself observed repeatedly marked lateral rotation of the post-partum uterus, and since my attention has been specially directed to the subject, I have in nearly every confinement which I have attended, been able to assure myself that such rotation existed. I am thus confident, alike from my own experience clinically, and from the records of others, that in by far the majority of cases, the uterus, in the third stage of labour, and immediately post-partum, lies obliquely in the pelvis with its left edge forwards, and that this state of matters is much more common at both these times than in any other circumstances. I have often observed right

lateral rotation of the uterus in the third stage, where rotation could not be definitely made out during labour, and my experience is that right rotation occurs in the third stage just as frequently after right occipito posterior (O.D.P.) as after left occipito anterior (O.L.A.) cases.

Where the abdominal walls are very thick, it is difficult to satisfy onsself exactly as to the position of the uterus, and it has chiefly been in such circumstances, that I could not make sure as regards the existence of rotation.

There is no doubt then, that , although in the non-pregnant condition there is a certain amount of rotation of the uterus, yet that this rotation is greatly increased during pregnancy, especially in the later months, and persists during the early days of the post-partum period.

The uterus is rotated to the right in probably between 80 and 90 per cent of cases, and one may practically assume, that, when the foetal vertex, face, or breech, present in the right oblique diameter of the pelvis, the uterus will, at the same time, be

rotated to the right. The one condition may be regarded as almost the corollary of the other, as the rotation of the uterus greatly determines the position of the presenting part.

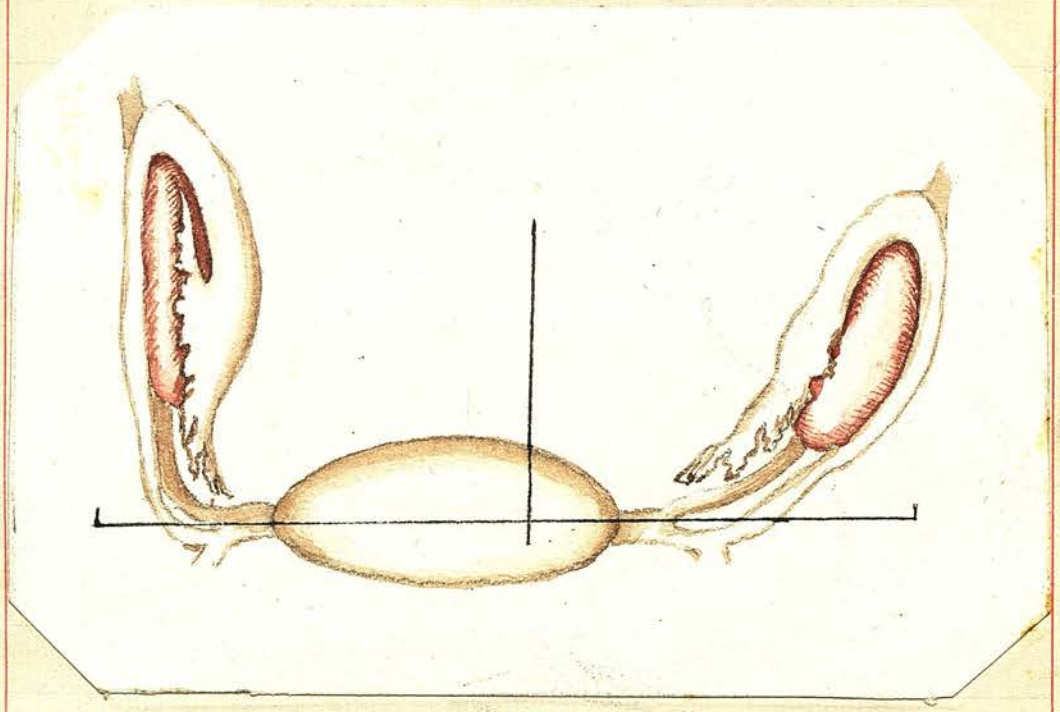
II. THE OVARIES, AND THEIR RELATION TO THE UTERUS BEFORE AND DURING PREGNANCY.

Each ovary, in the unimpregnated condition, is situated at the entrance to the true pelvis, about two centimeters from the corresponding horn of the uterus. Hasse describes the long axis of the ovary as lying transversely in the pelvic cavity, with slight obliquity, the opposite organs diverging anteriorly.

Schultze has asserted that the long axis of the ovary lies antero-posteriorly in the pelvis.

His, from his more recent investigations, believes the truth to lie between these statements. He never found the uterus symmetrically in the middle line. When the uterus inclined to the right, the right ovary lay with its long axis completely vertical, and with one side closely applied to the outer bony wall of the pelvis, but the left ovary

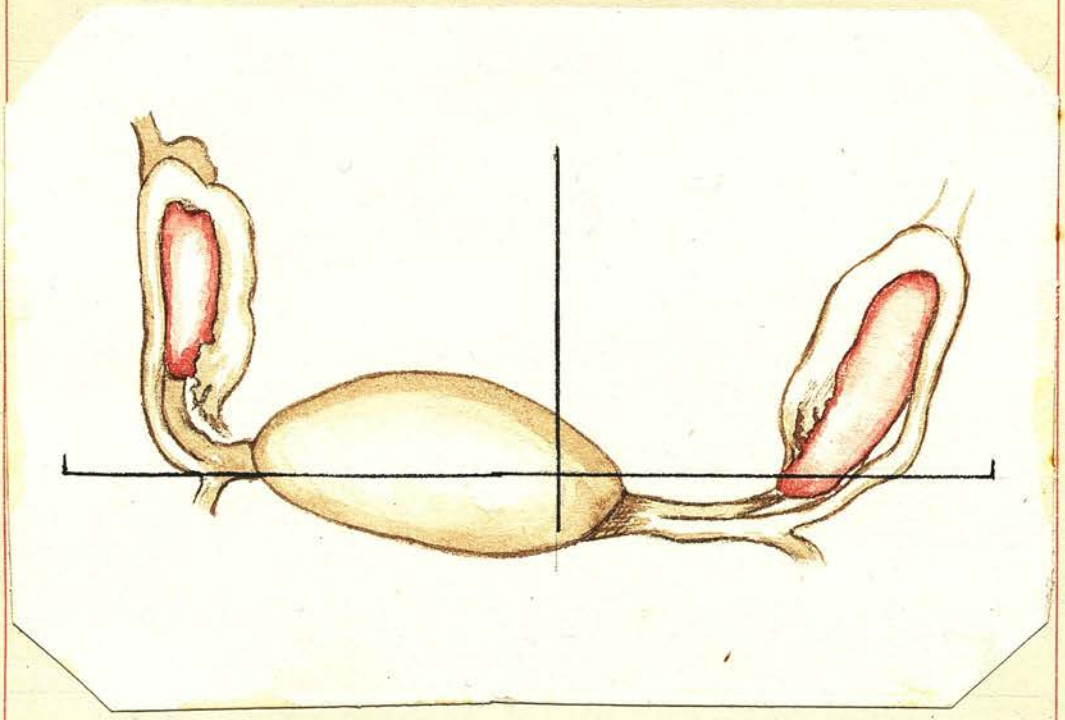
Plate IX.



Showing the normal position of the ovaries in the unimpregnated condition. Note the tendency of the left ovary to lie further forward than the right owing to the right lateral displacement of the uterus even where there is no uterine rotation.

(His).

Plate X.



Showing the normal position of the ovaries in the unimpregnated condition where there is right lateral rotation of the uterus in addition to right lateral displacement. The left ovary lies considerably further forward than the right, and its long axis tends to become oblique.

(His)

being dragged upon by the uterus, lay obliquely in the pelvis. From these observations His deduces, that uterine rotation will still further exaggerate these respective changes in the ovaries, and that, as a consequence to changes in position of the uterus, displacements of the ovaries ensue.

Rouget and Krause have observed, that, in consequence of the asymmetry of the uterus, the right ovary is on a plane a little posterior to the left ovary, which latter is in front and on a higher level. They describe the left ovary as lying close to the abdominal wall, through which it may be compresssed in the middle of a line, which would stretch from the anterior and superior iliac spine, to the symphysis pubis. Posteriorly, according to them, the right ovary is separated from the sacro-iliac articulation by a space of about 2 centimeters.

Portal has also recorded a difference in height between the two ovaries - the left being on a higher level than the right. This may be the case before pregnancy, but in my experience this only holds good during pregnancy or post-partum, when the uterus

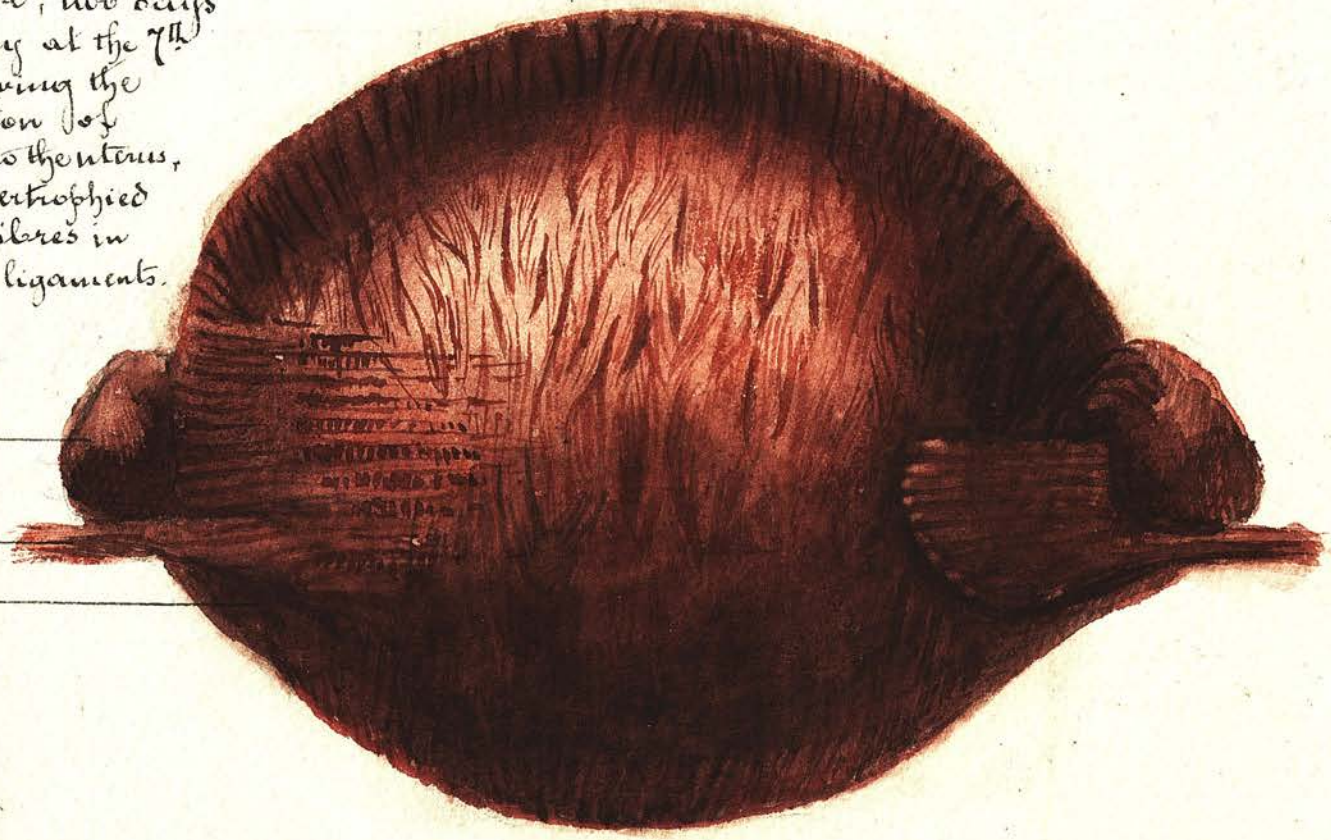
is very much lateriverted to the right, so as to tilt up the left ovary. When the uterus is replaced in the middle line, the right ovary is usually at a higher level than the left.

Kölliker believes that there is a great physiological variation in the position of the ovaries, but according to Olshausen, the only change of importance which the ovary undergoes physiologically is its ascent during pregnancy. He says:"In advanced "pregnancy, one or both ovaries (generally the left), "are often felt high up above the pelvis, and in "close apposition to the uterus. This is also true "of the puerperal period, but the ovaries resume "their original position about the twentieth day "after confinement."

Rouget well says à propos of the rotation of the uterus:"The effect of this rotation is to alter " the position of the ovaries. In pregnancy, owing "to the shortening and splitting up of the broad " ligaments, the ovaries are in much closer contact " with the uterus than in the un-impregnated con-"dition. They rise up into the abdominal cavity as " the uterus enlarges, and immediately after labour

Plate XL.

The fundus of the uterus from above, two days after delivery at the 7th month, showing the close apposition of the ovaries to the uterus, and the hypertrophied muscular fibres in the ovarian ligaments.



(Hélié)

"are on a level with the brim of the pelvis."

There are two important points to be noted about the position of the ovaries in pregnancy, firstly, that post-partum, their distance below the fundus uteri is not nearly so great as in the full time gravid uterus. After labour, the ovaries bear much the same relation to the uterus, so far as distance below the fundus goes, as in the non-pregnant state. The ovaries in a full time pregnancy, according to Chaignot, are at the middle or at least the superior third of the uterus. Secondly, the ovaries lie in close contact with the lateral walls of the uterus, owing to the shortening and splitting up of the broad ligaments. Their mobility is consequently greatly diminished, but has not entirely disappeared. Charpentier finds that they become vertical and almost touch the uterus.

Tarnier, Budin, Auvard, and E.Martin, in speaking of the Caesarian operation, all mention as a danger to be remembered, that the left ovary, owing to the rotation of the uterus, may be found lying under the median incision. Martin says this is

most apt to occur in Lordosis, and he cautions the operator against accidentally injuring the left appendages, and so giving rise to troublesome haemorrhage. Tarnier and Budin record cases in which this has happened.

Freund has likewise observed, that, in consequence of rotation, the left border of the uterus, with the annexa, approximated more closely to the abdominal wall.

In Winter's frozen section, which I have already referred to as an example of right lateral rotation of the uterus, he describes the position of the appendages thus:- "the conjunction of the left tube " is completely to be seen in front. It is 21 centi-"meters above the upper edge of the symphysis. From "this the tube runs straight down in front of the "ovary, and surrounds it below and behind. The "ovary lies close to the side edge of the uterus, four "fingers' breadths above the symphysis. The right "ovary lies somewhat higher, hidden behind the uterus. "The right tube is invisible in its upper course, "and appears first beneath the ovary. The left "round ligament runs considerably nearer the median

"line than the right."

Schroeder and Stratz likewise confirm, from their own observations, the fact that, as a consequence of the rotation of the uterus, the ovaries follow its movements, and so one lies more anteriorly, and the other more posteriorly. They have also observed that, in consequence of the anteflexion of the puerperal uterus, and the relaxation of its appendages, the ovaries fell forward over the tubes.

Condition of the ovaries during Pregnancy.

There can be no doubt but that the ovaries increase in size during pregnancy. Murat, Velpeau, and Chereau say they are softer and more voluminous; Courty, Joulin, and Cazeaux say they are notably augmented, while Stoltz, Jacquemier, Tarnier and Chantreuil, say they are doubled in size. The ovary which contains the corpus luteum is always the bigger of the two.

Muscular Fibres of Ovary.

Rouget first pointed out that the ovary has a great deal of muscular tissue in its substance.

Smooth muscular bundles descend from the lumbar region, and accompany the ovarian arteries and veins, they continue into the posterior division of the broad ligament, and contribute, with other bundles coming from the uterus, to constitute a muscular mesovarium (the ovarian division of the broad ligament) whose bundles penetrate with the vessels into the hilus of the gland. From thence they radiate, dividing and crossing each other, towards the periphery of the organ, where they bend into an arch, containing, in the meshes of their network, ova and Graafian follicles. Rouget quotes from Pflüger who has observed peristaltic contractions of the ovary in frogs, in whom Aeby found later smooth muscular fibres which accompany the vessels. His has also observed contractibility of the stroma of the ovary in a cow immediately after death. Rouget has found that, in accordance with the observations of Aeby at the period of menstruation, and of Grohe, Klebs, and His during gestation, the specific characters of the smooth fibres are more distinctly accentuated at those periods in the contractile elements of the ovary. Hélie finds that the muscular fibres of the

ligament of the ovary, which are greatly hypertrophied in pregnancy, terminate without by insertion on the fibrous membrane of this organ at its internal extremity, and in all the extent of its inferior border.

H. Thomson, working under Professor Küstner, has published a paper this year, with some observations on the changes which occur during pregnancy, in the tubes and ovaries of rabbits. According to him, the ovaries do not change their structure in pregnancy and in the puerperium to any very marked extent. During the whole term of pregnancy, and during the first days of the puerperium, they are larger, softer, and of a more hyperaemic condition. About six days after delivery they had again attained their normal condition. He found however, that the tubes, both in pregnancy and in the puerperium, had undergone considerable change in texture. They become richer in blood, more succulent, and seem to increase in bulk. The muscles are hypertrophied as in the uterus, only less so, and involution gradually takes place during the puerperium, as shown in the accompanying table. There seems no doubt but that

Plate XII.

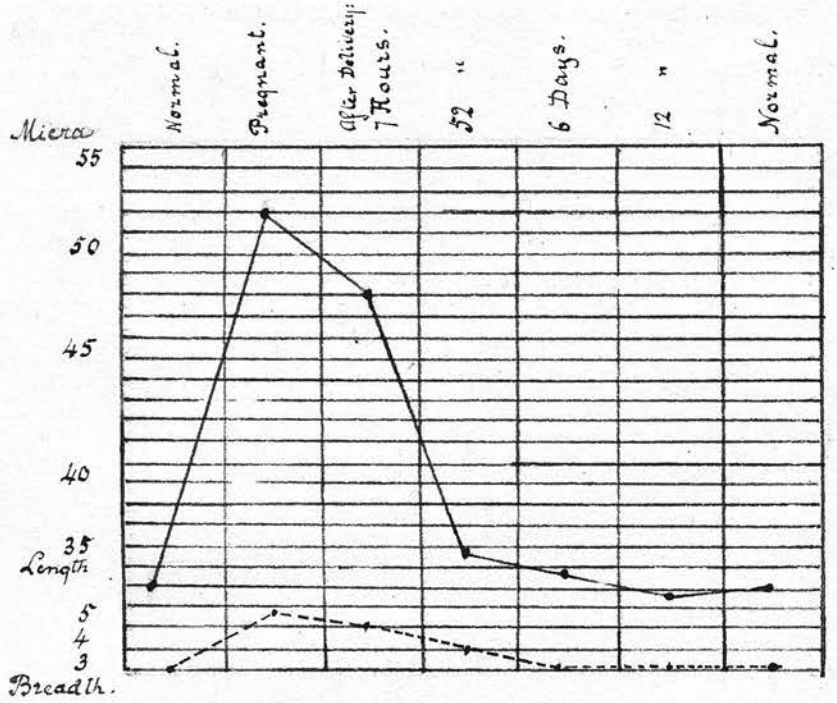


Table showing the rate of involution of the Fallopian tubes of rabbits after delivery. The two curves represent respectively the length and breadth of the tubes. The numbers represent micrammillimeters.

(H. Thomson.
Dorpat.)

muscular fibres in the ovaries and Fallopian tubes in women undergo hypertrophy with the pregnant uterus, and that they, as well as the uterus, involute during the puerperium. Puech believes that after delivery the ovaries atrophy slightly.

Nervous Supply of the Ovaries.

The uterus and ovaries have a very rich nerve supply. The nerves are derived from four sources : - (1) The Spermatic, (2) the Hypogastric, (3) the conjoined Hypogastric and Sacral, and (4) the internal Pudendal.

The ovarian plexus is an appendage of the renal plexus, and accompanies the ovarian artery; at the level of the hilus its branches penetrate with the vessels into the interior of the gland, and ramify themselves in the cortical zone. Gaskell finds that cerebro-spinal nerves pass to the Hypogastric plexus, & thence to the uterus and ovaries by visceral branches of the 2nd and 3rd sacral nerves, which form part of the pelvic splanchnics and are known as the nervi erigentes. The sympathetic fibres, on the other hand, pass to the inferior mesenteric ganglion, along

the rami efferentes of that ganglion, and thence to the hypogastric plexus.

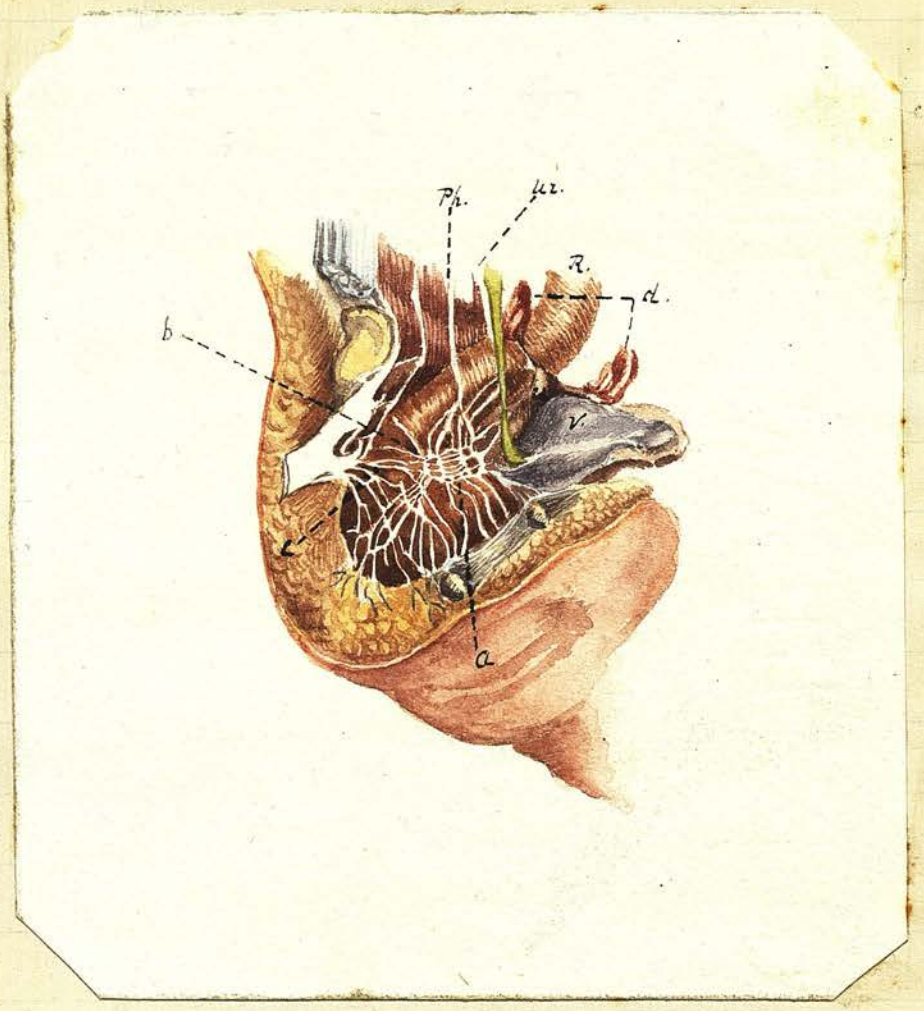
Elischer finds that the nerves of the ovary enter into its substance in the form of medullated fibres, accompanying the looped and tortuous vessels that pass to the hilus, and run also in the proper ligament of the ovary.

Frankenhaüser has shown that the nerves of the uterus and ovaries increase in number and size during pregnancy.

I have had reproduced some of Lee's and Frankenhaüser's plates, and one of Jastreboff's, to illustrate the rich ganglionic nervous supply of the uterus and ovaries, and its greater development during pregnancy.

Braxton Hicks, after remarking how intimately the uterus and ovaries are connected with the sympathetic nervous system, and how they are almost entirely supplied by ganglionic nerves, goes on to say that the nervous structures and ganglia grow and increase in pregnancy; that the susceptibility of the uterus is increased, and its reflex phenomena more marked.

Plate XIII



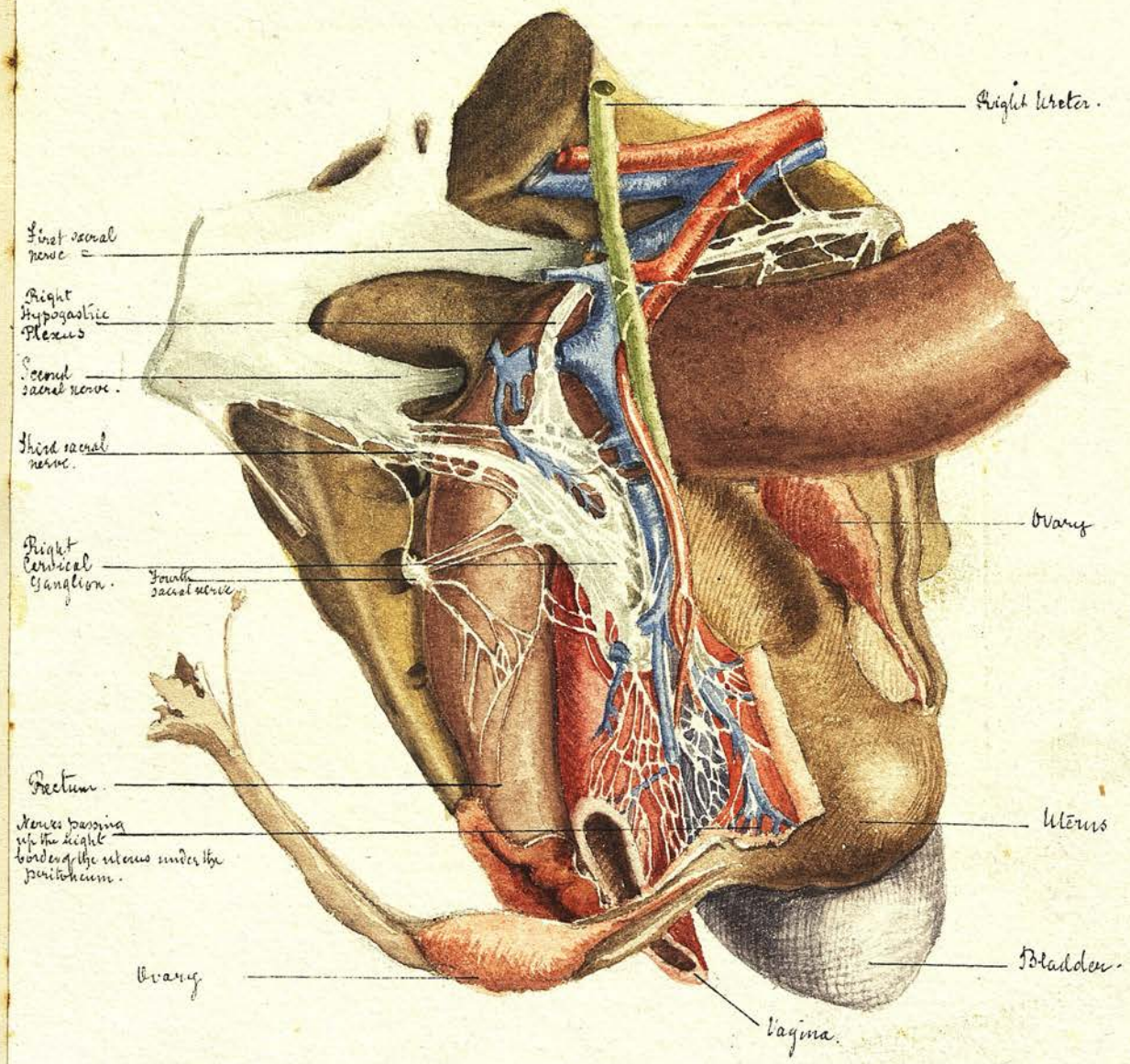
The pelvis of a newly-born female child. The right os innominatum removed.

Ph. Plexus hypogastricus. a. Ganglia utero-vesicalia. b. Ganglia recto-vaginalia. c. Twigs of sacral nerves. u. Uterus. v. Bladder. r. Rectum. d. Ovaries.

(Gastreboff.)

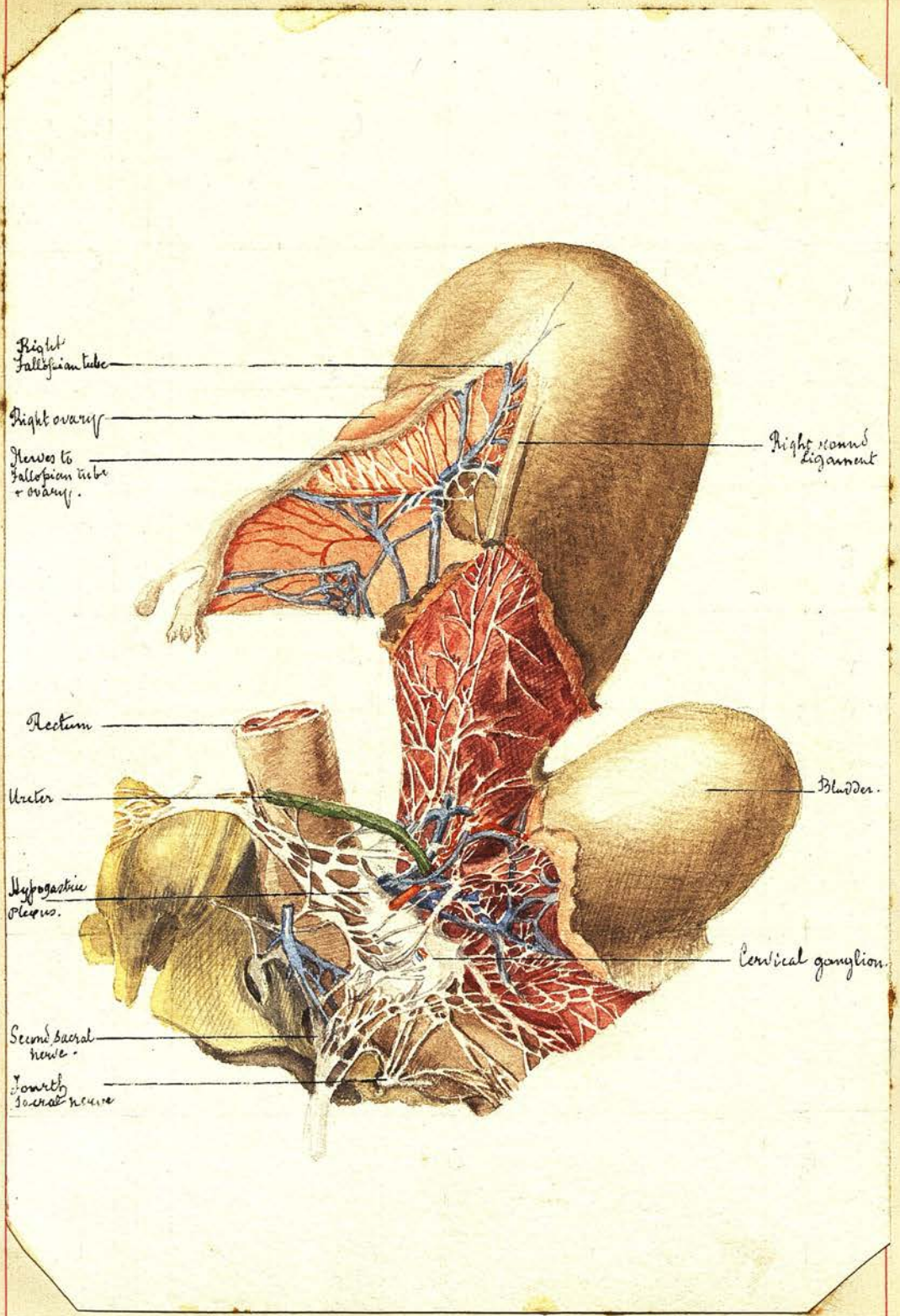
Same size as original drawing.

Plate XIV.



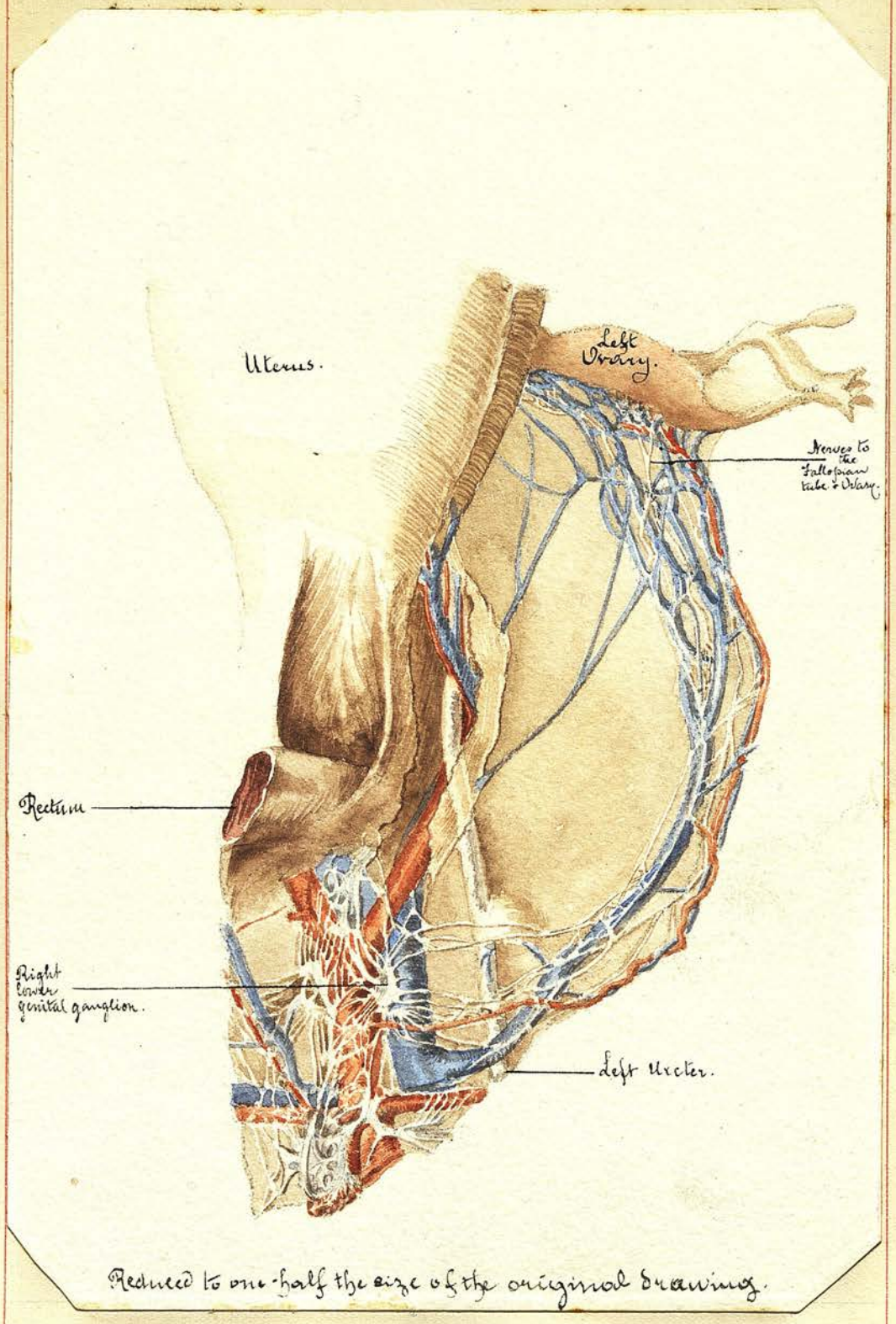
Cervical Ganglion and Sacral nerves of the right side of an unimpregnated Uterus.
(Frankenhäuser.)

Same size as original drawing.



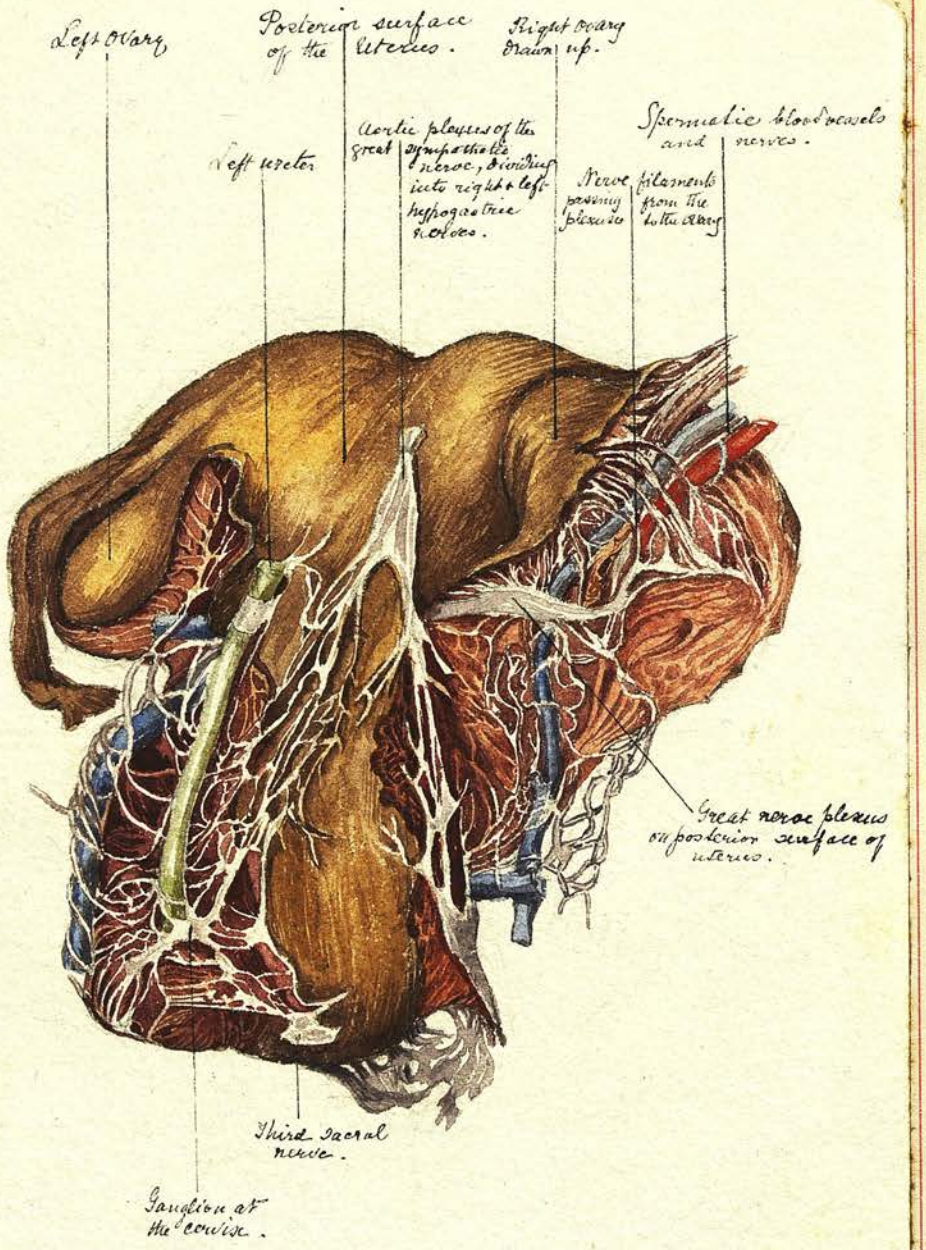
Cervicalganglion. **Sacral** and Uterine Nerves of the right side of a pregnant Uterus. (Frankenhäuser).

Reduced to one-half the size of the original drawing.



Reduced to one-half the size of the original drawing.

The genital nerves and the ramification of the ovarian nerves in an empty pregnant Uterus. The posterior peritoneal layer of the broad ligament has been removed.
(Frankenhäuser)

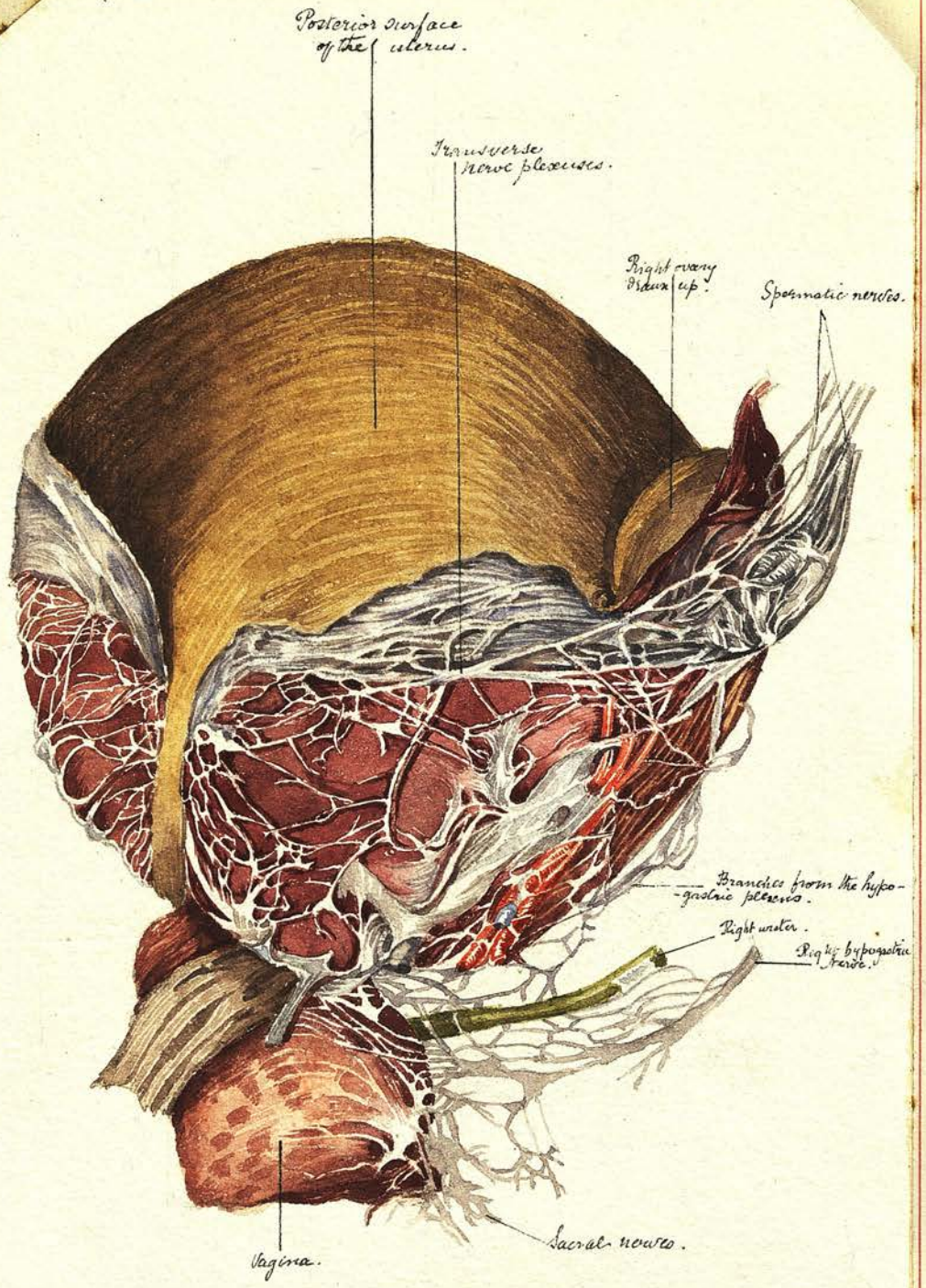


Represents the nerves of the uterus in the sixth month of pregnancy.

(Lee).

Reduced to one-half the size of the original Drawing.

Plate XVIII.



Reduced to one-half the size of the original drawing.

Represents the right spermatic, hypogastric and sacral nerves passing into the great transverse plexuses under the peritoneum on the posterior surface of the gravid uterus, at the end of the ninth month. (Lee).

Vascularity of the Ovaries during Pregnancy.

Velpeau says that during pregnancy the blood-vessels of the ovary dilate, sometimes to the point of rupture. Roux, Murat, and Chereau say that there is a spongy state of the organs in pregnancy, due to the augmentation of calibre of their vessels, which bring blood to them in greater abundance. Chereau and Hervieux rely on this physiological congestion to explain the frequency of puerperal ovaritis. Churchill and Stoltz also believe that there is increased blood supply. Bischoff and some others have denied this engorgement of the ovarian vessels in pregnancy.

It seems to me, however, that all the evidence is in favour of increased blood supply during gestation. The ovaries are supplied from the same arterial trunks as the uterus, and if there be not active congestion, there will be at least passive congestion, as may be seen in the rectum, vulva, and lower limbs.

Devalz and Richet have described varicose dilatations of the bulb of the ovary in the broad ligament during pregnancy, which from excessive distension

have even ruptured, causing a variety of peri-uterine haematocele. They believe this ovarian varicocele to be the result of the frequently repeated congestion at the menstrual epochs.

Sensitiveness of the Ovaries during Pregnancy.

Loumaigne and Puech deny the sensitiveness of the ovary in the normal state. They base their assertions on cases of hernia of the ovary. In their cases, however, the ovaries had become atrophied, and consequently were not tender to touch.

Guersant, and De Coste have observed cases of ovarian hernia, in which "the sensation of pain on pressure was similar to that of a testicle." (Chaignot).

Percival Pott's well-known case of double ovarian hernia, shows that in a healthy woman the ovaries were exceedingly tender on the least pressure. Hegar and Kaltenbach also show this, and Murat likewise adduces instances of the tenderness of healthy ovaries.

Puech thinks that the ovaries are only tender in what he calls abnormal conditions, as when they are congested in menstruation.

Professor Courty of Montpellier writes as follows: - "La sensibilité normale de l'ovaire est "exquise,(elle n'a pu être niée que par des médecins "inexpérimentés); sa sensibilité pathologique est "developpée à un tel point que la moindre pression y "provoque des douleurs atroces."

There can be no doubt that congestion, whether active or passive, will make the ovaries more sensitive to external pressure, and pregnancy certainly fulfils this condition.

After thus considering the position of the uterus and ovaries in pregnancy, one is impressed with the fact that, in consequence of the uterine rotation so commonly to be observed, one of the ovaries (usually the left) is brought close under the abdominal wall, and consequently might possibly be injured by pressure through the abdominal wall.

There can be no doubt that the ovaries during pregnancy are very sensitive, and pressure upon them causes pain which is sometimes very severe.

Budin has recorded some very interesting cases which prove this. He has noticed that in palpating the abdomen in pregnancy, he has sometimes found

moderate pressure with the fingers on the abdomen produce very sharp pain. The pain was clearly localised, was distinctly produced by the pressure of the fingers on one spot, and caused the patients to groan or cry out. Pressure on the neighbouring parts was not in the least painful. At the spot where the pain was felt, a small body moved below the finger, being moveable transversely, but not perpendicularly. Its form was oval, its great axis usually vertical, but sometimes oblique from above downwards and from within outwards, and its size was generally about that of an olive. This, Budin believes to be the ovary. It is nearly always to be found on the left side near a line drawn from the umbilicus to the anterior superior spine of the ilium. A resisting surface, generally the foetal back, allows the pain to be more readily provoked, and the moveable body more easily to be found. Budin goes on to say that the ovary is to be felt to the left and forwards on account of the rotation of the uterus during pregnancy, which brings its left border forwards, and by the foetal back being

to that side. He does not say how many cases he had investigated, but that "in only two of the many cases" which he has observed, was the right ovary to be felt to the right side, and forwards, and in these cases the foetal back was also forwards and to the right.

If the uterus contract, it is easy to determine by pressure a sharp localized pain, and to feel the ovary rolling beneath the fingers. When contraction ceases this is often more difficult. The round ligament may be felt rolling under the finger, but it is painless on pressure, and is not oval in shape, but more like a cord.

None of Budin's cases were hysterical.

Budin proved that this tender oval body as described, was really the ovary, in a case in which he had palpated it previous to a Porro's operation. Both Tarnier and he, found before the operation, the ovary lying to the left, and towards the middle line of the abdomen; it rolled under the finger, and was painful when pressed. When the abdomen was opened, the first part of the uterus which presented itself was the left border with the ovary adhering, and they proved that it was it which they had

previously felt through the abdominal wall.

Chaignot, in less than three months, made thirty consecutive clinical investigations on Hospital patients, and found that abdominal palpation employed at the end of pregnancy may produce on the sides of the uterus, in a certain number of women, a sudden, and sometimes very, sharp pain. He has identified this pain with pressure on the ovary, and he finds that it is most easily produced when the ovary lies on a resisting surface, such as the back of the foetus, or the contracting uterus. "The "pain is felt most frequently to the left, owing to " the torsion of the uterus, bringing forward its left "lateral edge".

Its usual position, according to Chaignot, is near a line drawn from the anterior superior spine to the umbilicus, usually a few centimeters above it in the last month of gestation. The average distances are as follows:-

8 to 10 centimeters from the anterior superior spine, 17 to 19 centimeters from the umbilicus.

6 centimeters behind the prominence formed by the round ligament.

	Left side	Right side
Distance from anterior superior iliac spine.	9-10 Centim.	7-8 Centim.
Distance from umbilicus	17-19 "	18-20 "
Distance from round ligament.	5-6 "	5-6 "

I have made a short abstract of Chaignot's cases which I here append : -

23 cases	3 cases	4 cases
Ovary felt on left side.	Ovary felt on right side.	Ovary felt on both sides.
17 were O.L.A. throughout. 3 were O.L.A. with left ovarian pain to begin with. One changed to O.D.P. & the left ovarian pain changed to right ovarian pain. One changed to O.L.P. and the pain on pressure disappeared, and the ovary likewise ceased to be felt. One changed to O.D.P., and the ovarian pain, though still in the same place, was not nearly so sharp. 3 were O.D.P. throughout.	3 were O.D.P. throughout.	2 were O.L.A. One was a hysterical patient; the foetus was very large, the uterus was inclined to the right, but there was no rotation. The other showed right lateral inclination and slight right rotation. The right ovary could only be felt during a pain as it was further back. 2 were O.D.P. There was no rotation in either case. In one there was no lateral inclination.

ANALYSIS OF CHAIGNOT'S CASES.

The vertex of the foetal head lay with its long diameter in the right oblique diameter of the pelvis, in every case to begin with (one changed to O.L.P. afterwards.).

22 primary O.L.A. in 30 cases = 73.4 per cent
8 primary O.D.P. in do = 26.6 do

23 cases had left ovarian pain = 76.7 do
3 " " right do do = 10 do
4 " " double do do = 13.3 do.

Chaignot believes that the reason why, in right occipito posterior cases, the anterior ovary cannot well be felt to the left, is because there is no resisting foetal back to press it against. He believes that "the size of the foetus, multiple pregnancy, "nervous and irritable temperament, and hysteria, "are among the conditions which favour the appearance "of ovarian pain, and especially its intensity."

Chaignot has likewise sought for the ovaries post-partum, within 8 or 10 days, but he was never able to make them out definitely except once, "as "the hard resisting plane of the uterus is then want-"ing, and it would require very deep palpation."

He has provoked ovarian pain by pressure during the puerperium, which was always felt several centimeters below a line drawn from the anterior superior spine to the umbilicus, and the less recent the delivery, and the more retracted the uterus, the deeper the pain is. When he found ovarian pain after delivery, it was generally during the first days. The furthest period at which he could produce it was the 8th or 9th day. His conclusion is that the ovarian pain produced by pressure during pregnancy, can be reproduced after delivery.

Féré records two cases of pregnancy and labour in hysterical women who were delivered in a state of trance. In both cases he could palpate the ovaries, which were very tender on pressure. He watched the tender spots ascend with the uterus during pregnancy, and descend with it after labour. The left ovary was the one best felt, and there was ovarian pain on pressure post-partum.

Charcot has noted that, in hysterical women, although the microscope has not yet discovered any special anatomical lesion, the ovaries are the seat of a swelling which renders them more accessible to

exploration.

I have myself been able repeatedly to palpate the ovaries during pregnancy, and in every case, even moderate pressure elicited pain.

The palpation of the ovaries which we have hitherto been considering, has however, been comparatively gentle, and in many cases the ovaries were the objects for which the palpation was made, all pressure immediately being removed as soon as ovarian pain was elicited.

The uterus in the third stage of labour, is however, often subjected to a much more severe form of palpation, a palpation which is necessary either for the purpose of stimulating it to contract firmly, or for hastening the expulsion of the placenta from its cavity. In many cases this palpation, or rather compression, requires to be very energetic and prolonged, and I am of opinion that this compression, which is only intended for the uterus, includes sometimes one or both ovaries as well, and that they in consequence, may be injured in the third stage of labour by forcible compression against the contracted uterus.

(1) In the third stage of labour, the ovaries, as we have seen, lie close to the fundus uteri, and so the hand grasping the fundus could easily grasp the ovaries at the same time. The conditions are different to what they were before the expulsion of the foetus, for then the fundus is far distant from the ovaries, and firm pressure can be made upon it (as is sometimes done in expressio foetûs) without fear of including the annexa.

(2) The pressure is often pretty vigorous in the third stage.

(3) The rotation of the uterus, causing in the majority of cases the left ovary to come forwards towards the middle line, makes the ovary more liable to be grasped.

(4) The ovaries in the third stage are lying just at the brim of the pelvis, and the left ovary is apt to be squeezed or pinched between the bony pelvis and the hard contracted uterus, if forcible pressure downwards be made in an awkward application of Credé's method.

I shall now detail three cases which have come under my notice in practice, in which intense pain was experienced during the compression of the uterus in the third stage, followed by a further development of remarkable nervous phenomena. At the time, the cases were puzzling enough, and the symptoms were not easy to account for. In view however, of what we have just been considering, I think there will be little difficulty in coming to a conclusion as to the aetiology of the symptoms which were observed.

The cases are shortly as follows : -

CASE I. Mrs.L., aged 28, was delivered of her fourth child in the end of November 1885. The patient is of a highly nervous temperament, and her family history shows a distinctly neurotic tendency. One sister frequently developed a neurotic temperature of 108°F. A second sister had a persistent nervous cough for months, and their mother was subject to fits of catalepsy. The whole family has been under Dr.Croom's personal observation for years. The previous labours were normal. The labour was an unusually short one, the child being born four

hours after the commencement of pains, and the patient required neither chloroform nor forceps. The child was born half-an-hour before Dr.Croom's arrival. The nurse, who was a more than usually competent woman, grasped the uterus after the birth of the child and compressed it firmly till his arrival. During that time it will be observed the uterus was firmly and forcibly compressed, by a nurse thoroughly conversant with the Credé technique of delivering the placenta. The patient complained of much pain during the kneading of the uterus. The uterus contracted well, and there was no haemorrhage. Soon after the expulsion of the placenta she suddenly became unconscious, and remained so for nearly three hours. The nurse, a most experienced person, to whom I wrote for some particulars of the case, writes as follows:- "I have seen a few people die, "and I never saw any one look more like it than she. "She went all through the death struggles, and had "the peculiar pinched look in the face of a dying "person. She then became as if she were dead, and "remained so for over three hours with no pulse at "all. Then gradually the pulse began to flutter, and

"about half-an-hour after that she was able to take "a little stimulant and then talk." Such is the nurse's graphic description of the case. The patient's symptoms appeared so urgent that her husband was called up, as Dr.Croom supposed her to be in the very article of death. Her subsequent puerperal history was perfectly normal.

CASE II. Madame de B., aged 27, was delivered of a male foetus in December 1887. She was a healthy young primipara. The labour was perfectly normal, except that from the rigidity of the external parts secondary inertia threatened to set in, and the operation of low forceps was accordingly performed by Dr.Croom. After waiting a reasonable time for the delivery of the placenta, it did not seem to separate from the uterus, and Dr.Croom proceeded to apply the Credé method of delivery. The patient, who was semi-anaesthetized, complained of much pain during the process. After considerable difficulty and prolonged pressure, the placenta had to be extracted with the hand. There was haemorrhage, but only slight. Immediately after the extraction

of the placenta the patient became pulseless, cold pale, and gasping. This condition was promptly combated by the injection of ether, and for some time her pulse improved and her general condition was somewhat better. In half-an-hour she was again completely collapsed, and grave fears were entertained for her life. Ether and rectal injections were again employed, and again she rallied. This sequence of events occurred at intervals during the evening. As her condition seemed to be grave at midnight, I remained in the house all night and treated her freely with stimulants. In the morning she was better, and she made an uninterrupted recovery.

CASE III. Mrs.L., aged 27, was delivered of her first child in January 1888. The patient is a healthy, well-developed woman of a somewhat nervous temperament. Her first stage lasted about eight hours, her second stage about three. The passages were roomy and moist, and dilatation proceeded satisfactorily. The head at the beginning of labour was right occipito posterior. It rotated forwards, however, of its own accord. A little

chloroform was administered towards the end of the second stage, and delivery was hastened by forceps, as the patient was beginning to get somewhat exhausted, and the pains were commencing to be less energetic. After the birth of the child she partially awoke from anaesthesia, and complained loudly of excessive pain when the uterus was grasped, and begged hard that it should be desisted from. The pain made her feel sick and faint, and it was intensified each time the uterus was compressed, till it became quite unbearable. Just as the placenta was expelled from the vulva, the patient suddenly became unconscious. A certain amount of restlessness and uneasy moving about in bed, preceded the loss of consciousness. The uterus was firmly contracted, and there was no haemorrhage either from it or from the cervix or vestibule. The pulse could not be felt, the breathing was almost stopped, and the patient appeared to be on the point of death. Several times, indeed, she seemed actually moribund. I was greatly alarmed by these symptoms, and as I feared that the patient was going to die in my

hands, I asked Dr,Croom to come and see her. This he kindly did, and he likewise shared in my anxiety. She lay in this condition for nearly three hours, and then gradually recovered consciousness.

The patients, it will be seen from the above reports, were all young, healthy women of decidedly nervous temperaments, two of them primiparae and one a iv.para. There was nothing specially remarkable about the first or second stage of labour, in any of them, except that two were low forceps cases, and two of them had chloroform administered towards the end of the second stage. Forceps were applied to prevent exhaustion and for fear of impending inertia. None of the patients lost more than about twelve ounces of blood in the third stage, their uteri contracted firmly and well, and in no sense of the word did they suffer from post-partum haemorrhage, concealed or otherwise. Eclampsia and cardiac disease could be clearly eliminated in all three. Yet they all manifested decided symptoms of syncope and shock, became perfectly unconscious, with feeble,

rapid, irregular, sometimes imperceptible radial pulse, dilated pupils, shallow irregular breathing, and cold, clammy perspiration. The face, at first anxious, soon developed a vacant, torpid expression, and sensibility to pain absolutely and entirely disappeared.

This state of matters lasted for about three hours - fully longer in one of the cases - and there was of course complete inability to swallow. Free injection of stimulants both into the rectum and under the skin, and champagne by the mouth as soon as the power of swallowing returned, gradually, as it were, brought them back again to life. Sinapisms were freely applied to the praecordia, and it was with great difficulty that the body heat could be maintained in spite of hot-water bottles, hot blankets, and gentle massage. In from eight to twelve hours they had, to all appearance, quite recovered from the effects of the shock, and beyond a feeling of exhaustion, and some degree of tenderness in the lower part of the abdomen, nothing unusual was to be remarked. Their memory was a complete blank during the greater part of the attack.

In two of the cases the subsequent puerperal history was perfectly normal in every respect. In the third, persistent sleeplessness was a source of trouble, with occasional incoherence. This ultimately developed into a mild, but prolonged attack of puerperal melancholia, terminating, however, in complete recovery.

What, then, was the cause of these alarming manifestations? For alarming they most certainly were, even for a time making one fear that life had become almost extinct. And what lesson can be gathered from these three cases, so alike in their symptoms and in their termination?

Firstly, as to the cause. It will be observed that nothing unusual occurred in the first or second stage in any of the cases, and that the patients up to the beginning of the third stage were in an entirely satisfactory condition. It is to the third stage, then, that one must look for an explanation of the phenomena.

All the patients complained of unusual tenderness when the uterus was grasped by the hand, in the usual way, through the abdominal wall, after the expulsion of the child; and when the uterus was compressed

more forcibly, according to Credé's method, in order to squeeze out the separated placenta, the pain became so intolerable as to completely awaken them from their partial anaesthesia, and they shrieked in agony, declaring it to be worse than the whole labour put together. In one of the cases the uterus was somewhat soft and flabby, and it had to be kneaded pretty energetically before it contracted satisfactorily. There was, however, no haemorrhage to speak of. The shock in each case occurred either during or immediately after the expulsion of the placenta from the vagina, and when the uterus was being firmly grasped through the abdominal wall. There can be no doubt that the cause of the symptoms was the fact that one or both ovaries were being squeezed and bruised by the pressure of the external hand compressing one or both against the hard contracted uterus. This accounts equally for the exquisite pain from which the patients suffered when the uterus was being compressed, and for the syncope which supervened on the intense shock thus produced.

I have repeatedly seen an analogy to this occur

in cases of abdominal section for the removal of the ovaries and Fallopian tubes. If, as sometimes happens (especially in cases of fibroid tumour, with healthy ovaries, and where the appendages are not easily brought to the surface), the ovaries should be somewhat roughly handled or accidentally torn, say by a pair of forceps, before the ligature has been tied; it is a matter of common observation that the patient, though fully anaesthetized, in the majority of cases becomes affected by modified shock. The pupils dilate, the face becomes deathly pallid, the extremities cold, a clammy perspiration breaks out, the pulse flutters, and the respirations become shallow and irregular. These symptoms pass off when the ligature is tightened, and the organ removed. If such a condition happens when atrophied, cystic, or even cirrhotic ovaries are irritated, how much more is it likely to occur when the large, congested, tender ovaries of pregnancy are forcibly compressed against the hard post-partum uterus, and when the patient is either not under the influence of an anaesthetic or is only partially anaesthetized.

The following are three cases in detail to illustrate this:—

CASE I. Isabella Bennet Aet.26, suffered from double salpingo-öophoritis. Abdominal section was performed in the Royal Infirmary on 19th May 1886, and both ovaries and tubes were removed. The appendages on the left side were adherent and difficult to reach. When brought to the surface, the pedicle was very short. The ovary was seized by a pair of Spencer Well's forceps to hold it up while the ligature was applied. Immediately the patient's breathing became affected, the pulse fluttered, the face changed in colour, becoming bluish white, and a cold perspiration broke out. The patient was all the time fully, but not too deeply anaesthetised, and her condition became quite satisfactory after the ovary was removed.

CASE II. Mrs.Telford, aet.31, suffered from double salpingo-öophoritis with extensive adhesions. Abdominal section was performed in the Royal Infirmary on 2nd June 1886. Great difficulty was

experienced in getting the appendages of the right side to the surface, and eventually only the tube was got away. The ovary and tube on the left side were both removed easily . The left ovary was grasped by a pair of forceps before the ligature was tied. The patient, who was breathing quietly and steadily at the time under the influence of ether, and with a good colour in her face, suddenly gasped, became deathly pale, retched violently, and manifested all the symptoms of shock. On the removal of the ovary she quickly recovered, and her condition remained satisfactory till the end of the operation, from which she made a good recovery.

CASE III. Mrs.Wright aet.36, suffering from a bleeding fibroid tumour of the uterus, reaching one finger's breadth above the umbilicus. The sound passed five inches into the uterus. The ovaries and tubes were removed on 4th April 1887 in Ward 28, Royal Infirmary. The ovaries were found practically sessile on the uterus, owing to shortening and splitting up of the broad ligaments by the fibroid growth.

Ordinary ligatures could not be applied, the clamp and cautery were used. Each time the clamp was applied, the patient manifested symptoms of transient shock, similar to those already described. The clamp included a small portion of each ovary in its grasp, and very soon after it was thoroughly tightened, the symptoms disappeared.

Curiously enough, the fibroid uterus in this case was rotated, so that the left ovary lay almost immediately under the incision. The tumour had to be considerably rotated round to the left, before the right ovary could be reached.

We can further find a similar analogy to this in the case of the testicles. Both the ovaries and the testicles are richly supplied with nerves, derived in each case from the great sympathetic system.

Valentin has clearly established the homology of these organs. He says : - "The first origin of "the ovary and testicle is entirely analogous, and "both develop in the same way for some time, until "the period when a different character indicates "itself, when the continuation of the development of "a tubular gland ceases in the ovary, and the

"characteristics of its first structure become more "and more difficult to distinguish".

Instances of shock occurring after injury to the testicle are very numerous.

Pirogoff speaks of a judicial case where death by shock speedily followed upon intentional crushing of both testicles. The section showed only extravasated blood in the tunica dartos, and under the albuginea.

Erichsen has observed during castration, at the moment of cutting through the spermatic cords, a sinking of the pulse, even when the patient was completely anaesthetized, so that it seemed better to stop using chloroform at the moment.

Fischer has observed shock resulting from the too tight strapping of inflamed testicles.

Vincent records a case of passing shock after a kick on the testicle, and Hosteing a similar case after crushing of the testicle on the saddle.

Pelikan has shown that bruises of the testicle or spermatic cord are more apt to produce shock, than clean wounds.

Hunter saw a sudden death during castration,

and dangerous convulsions during an operation for hydrocele.

Why then should not shock occur just as well after bruising of the ovary, as it does after bruising of the testicle?

Any strong irritation of the peripheral sensitive nerves, or of the sympathetic nerves, is capable of engendering a condition of exhaustion of the spinal cord, which manifests itself in weakening of motility, sensibility, and reflex power, and in a depressing influence on the heart and respiration.

Shock is a functional disturbance, and has no real pathological anatomy, though after death, there is sometimes to be found enormous distension of the abdominal blood-vessels, supposed to be due to paralysis of the splanchnic nerves.

The theories as to the production of shock are endless. Irritation of the vagus, simple paralysis of the heart, or reflex, partial, or general vascular paralysis cannot wholly account for it. The attempts

to explain it by saying that it is due to contraction of the small arteries, or to changes in the composition of the blood, have not been proved. In short, the vascular apparatus and its contents give no satisfactory explanation of shock. The only satisfactory hypothesis, according to Groeningen, is "that "which occupies itself with the whole sphere in which "the appearances we have considered originate". The most feasible explanation is that shock is an exhaustion of the medulla and of the spinal cord, caused by violent injuries. The irritations which influence sensitive nerves can be classified according to the resulting excitement into four stages. (Groeningen) ;-

(a) The lowest stage is ineffectual. The excitement does not go beyond the threshold of consciousness, and evokes no other appreciable effect.

(b) The middle stage destroys (auslöschen) the proportionate feeling.

(c) The strong stage effaces the fineness in the feeling of quality, and permits the feeling of pain, or one akin to it, to come into the foreground.

(d) The highest, destroys every feeling, fugitive or lasting.

The lower stage of irritation, applied with, or immediately after a higher one, remains without effect, or as Fourneaux Jordan well puts it: "Shock is to a certain extent a protection against shock".

Every excitement of a nerve calls forth in itself, as well as in the central organs, a change tending to fatigue; the collective appearances of reflex stoppage, and of reflex paralyses are thus explained in a satisfactory way.

Brown-Séquard believes that irritations of nerves may produce three kinds of shock.

1st. Shock where reflex arrest or diminution of the heart's action predominates.

2nd. Shock where there is a peculiar inhibitory influence on the central organs of respiration, the heart continuing to beat with more or less vigour.

3rd. Where a powerful influence is exerted by the nervous centres on the nerves able to act on circulation, secretion, and nutrition, so as to produce a cessation of most, if not all, the ordinary interchanges between blood and tissues. In this third form of collapse, the blood-vessels are generally contracted, there is always a diminution of breathing, and a weak, sometimes slow pulse.

Watson lays special stress on the fact that shock is determined in intra-peritoneal operations from reflex action by irritation of the sympathetic.

Kaltenbach considers reflex paralysis of the heart to be the essence of shock in abdominal operations. He goes on to say that in the milder cases, the symptoms of shock subside as soon as the cause is removed, for example, after the cessation of extensive manipulation of the intestines. In some cases, however, the patients die during the operation, or within three or four hours afterwards.

The splanchnic is the vaso-motor nerve of the intestinal blood-vessels, so that it governs the largest vascular area of the body; it is like-wise the sensory nerve of the intestine, and under certain circumstances, it may give rise to very painful sensations. According to Landois and Stirling, the Trigeminus and Splanchnic nerves are the most sensitive to pain in the whole body.

Fourneaux Jordan in his classical essay on shock says:"the peculiar condition, which more than "any other, influences shock, is the susceptibility "or excitability of the nervous system."

Injuries of the abdominal viscera are always

marked by extreme, and severe shock. This is to be explained by the impression made upon the cerebro-spinal system through the medium of the ganglionic. Women are probably more influenced by reflex irrita-- tions than men, and are liable to a severer form of shock.

CONDITIONS WHICH MAY SIMULATE POST-PARTUM SHOCK.

(1) SYNCOPE FROM HAEMORRHAGE. There is no doubt that not only are syncope and shock often associated with one another, but also that the manifestations of shock are frequently intensified by the co-existence of haemorrhage, which may or may not have gone so far as to produce syncope . At the same time, the two conditions are quite separate and distinct, and, in the majority of cases, are easily distinguished from one another. There has been, and still is, a great deal of confusion on the subject, some writers under the title of "Collapse" including both conditions, and others drawing hardly any distinction between them. This confusion is mainly due, I think, to the many pathological theories

which have been advanced regarding the nature of shock, most of which were erroneous, and calculated to mislead the clinical observer. I feel sure that the two conditions are frequently confounded, and that many cases of shock after labour are erroneously described as arising from the effects of haemorrhage. I shall have occasion again, however, to refer to this point.

Nothnagel has very clearly pointed out the differences between syncope and shock, and I cannot do better than quote some remarks he makes with regard to their differential diagnosis. He says :-

"After successful delivery, profuse haemorrhage occurs "on account of faulty contraction of the uterus. If "energetic measures be not taken at once, all the "symptoms of fainting appear, and there accompany "them, with or after fainting, the strongest general "convulsions, very like epileptic. The symptoms are, "oppression, sighing and rapid respiration, yawning, "paleness of the face, increase of oppression with "giddiness, feeling of general torpidity, cold pers-"piration, singing in the ears, sickness and inclina-" tion to vomit, the sight is darkened, and the

"surrounding voices cannot be heard. The pulse is "regular, but small and of low tension, and there is "quick recovery as a rule.

" Shock is quite different from this. In pure "shock there is no singing in the ears, no oppression, "no giddiness, no darkening of the sight. There is "irregular pulse, and irregular breathing. There "is no twitching of the muscles, no epileptic con- "vulsions, not such a marked loss of consciousness, "and no quick recovery."

In the torpid form of shock, the senses and consciousness are benumbed, the eyes are dull, vacant and motionless with dilated pupils; and there is subnormal temperature. The patient at first complains of coldness, and numbness of the limbs, and often the sphincters are relaxed, and there may be a tendency to nausea and vomiting. Shock usually produces a degree of syncope as well. In my cases, the complete unconsciousness was undoubtedly due to syncope, which was superadded to the shock. In all cases careful investigation must be made as to the existence of haemorrhage, concealed or otherwise.

(2) Shock has also to be distinguished from the effects of an overdose of ergot or ergotin. I have once seen such a condition, where undoubtedly more ergotin had been administered to a patient than was either necessary or safe. The patient complained of giddiness, and loss of sensation, and the respirations were shallow and slow. There had been hardly any haemorrhage in the third stage, but the uterus was flabby, and the ergotin had been given mainly from a prophylactic point of view. These symptoms soon passed off, after free stimulation. The pulse was not affected. Lauder Brunton has found that a solution of Bonjean's ergotin injected into animals, causes an affection of the nervous system indicated by inco-ordination, anaesthesia, and paralysis of respiration. The muscles are unaffected, and the motor nerves are not paralysed. The sensory nerves and spinal cord are paralysed. Ergot acts directly on the inhibitory apparatus in the heart itself, and tends to slow it, and ultimately to stop it in diastole. There is usually a rise of blood pressure at first from its stimulating action on the

and death is due to paralysis

vaso-motor centre in the medulla, and owing to the firm contraction of the intestines and uterus, rendering them devoid of blood, an extra quantity of blood is thrown into the rest of the circulation.

(3) The uraemic coma so often seen in puerperal eclampsia, is easily diagnosed from shock by the history of the convulsions, the nature of the pulse, and the state of the urine.

(4) Pulmonary Emboli from venous thrombosis, are the commonest cause of collapse and sudden death in the post-partum state, and might be mistaken for severe shock. Sudden dyspnoea and orthopnoea usually indicate this condition. Wernich has recently stated that, in his opinion, so-called shock is often due to small emboli.

(5) The entrance of air into the veins immediately after delivery, causes symptoms very similar to pulmonary embolism. Asphyxia and collapse usher in death.

(6) Collapse, and possible sudden death, may occur after labour as a result of pre-existing disease which has been aggravated by the labour.

For example, I have seen two cases where collapse and death followed soon after labour in patients who were suffering from mitral stenosis, and Barnes records a case of sudden insensibility followed by death , where post-mortem, a haemorrhage was found to have taken place in the left optic thalamus.

(7) Collapse or sudden death may likewise occur post-partum from totally accidental causes, as, for instance, in a case of Simpson's quoted by Auvard, where death rapidly followed the rupture into the peritoneal cavity of a large hepatic abscess.

Hysteria and Epilepsy must also be kept in mind as possible causes of insensibility after labour.

PREVENTION OF THE FORM OF POST-PARTUM SHOCK WHICH WE HAVE BEEN CONSIDERING.

Clearly the way to prevent the occurrence of the shock is to avoid bruising the ovaries in the management of the third stage. I have been unable to find any description of such a danger as this in the application of Credé's method. The only authors who mention anything about pain in the third stage

are Riol, and Spiegelberg. The former says, in speaking of expression of the placenta; - "The most "serious of the inconveniences of this proceeding is "certainly the pain produced - a pain which is some- "times not considerable, but which sometimes becomes "tolerably acute, if expression be practised for a "long time, and which obliges the accoucheur to have "recourse to another method of deliverance. When "the uterus is soft and flabby, pain is often pro- "duced by long compression, which is so sharp that " the patient can no longer bear the action of the "hand. Where a great deal of vigour is necessary to "expel the placenta, the pain is sometimes so great "that one must cease to express. There are some "women also, timid or nervous, sensitive and delicate, "who cannot bear the action of the hand on their "abdominal walls, and this pressure, even when slight, "causes sharp pain, and sometimes even cries, which "necessitate the employment of another means. I "have , however, seen women, who could not bear the "manoeuvres of expression to begin with, and who, "after a few minutes' rest, permitted a second and a "third attempt, which were always followed by success.

"Other women, it must be said, prefer uterine expres-
"sion to any other means of deliverance."

Neither Riol, however, nor any other writer, say a word of the ovary in connection with the pain.

How can we make certain of not including one or both ovaries in our grasp of the uterus during the third stage? Clearly by grasping the uterus antero-posteriorly, and avoiding its lateral borders. Now in all the descriptions of Credé's method §, this point is not made perfectly clear. It is implied, perhaps, but it is not stated. The directions given have all a reference to landmarks in the pelvis, not to the position of the uterus. We are told in effect, by all, to pass the ulnar side of the hand down in front of the promontory, the entire hollow of the hand lying on the fundus, and the thumb on the anterior uterine wall behind the symphysis pubis (Spiegelberg, Playfair, Lusk, Charpentier, Grandin &c.)

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§. When I speak of "Credé's method", in this paper, I only mean his method of grasping the uterus, which is the type of the universally accepted "Handgriff".

Plate XIX.

Showing the position of the hand, as recommended by Credé and others, in grasping the Uterus in the third stage of labour. The fingers are in front of the sacral promontory the thumb behind the symphysis pubis. The arrow shows the direction in which pressure is to be made.

(Credé)

Plate XX.

Showing the position of the hand, as recommended by Mundé, in grasping the uterus in the third stage of labour.

(Mundé)

Credé and Mundé figure the hand grasping the uterus with the thumb behind the symphysis pubis, and the fingers in front of the promontory of the sacrum. Now I contend, that, if the compressing hand be in this position, the uterus is not as a rule, grasped antero-posteriorly, and that the ovaries are consequently in imminent danger. In other words, (as we have already seen) <u>that the term antero-posterior quâ the pelvis, is not antero-posterior quâ the uterus, in the great majority of cases.</u>

To avoid the danger of touching the ovaries, and to make sure of grasping the uterus antero-posteriorly, the hand should be passed into the brim of the pelvis obliquely, and, as we can infer that in, at least, 90 percent of cases, the uterus is rotated to the right, the ulnar side of the hand should be pressed deeply down in the direction of the left sacro-iliac synchondrosis, while the thumb should be behind the right ilio-pectineal eminence, the fundus of the uterus resting in the hollow of the palm.

In the vast majority of cases, such a grasp of the uterus will entirely avoid the ovaries, and firm

Plate ~~XXI~~.

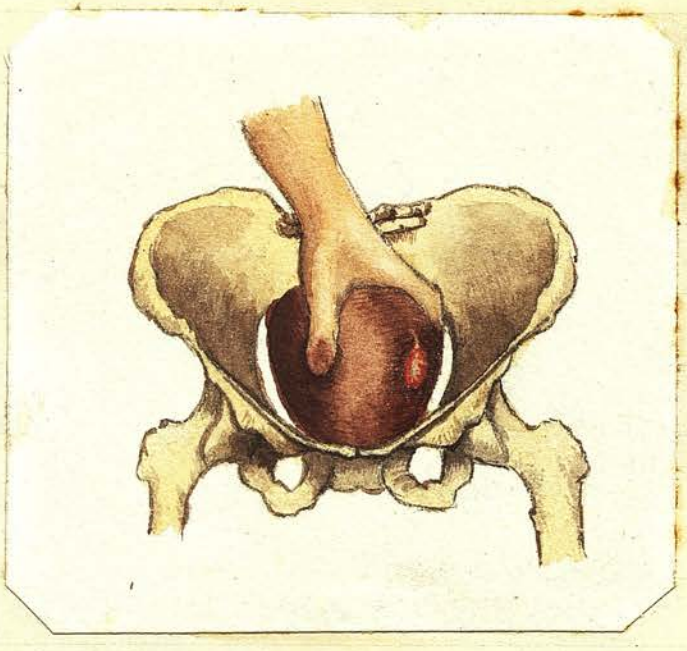

Diagram to show the oblique position occupied by the Uterus in the pelvis after the second stage of labour. The hand is grasping it antero-posteriorly. Note the oblique position of the hand in relation to the pelvis. It will be seen that the right ovary lies on a higher level than the left.

(Haig Ferguson).

Plate XXII.

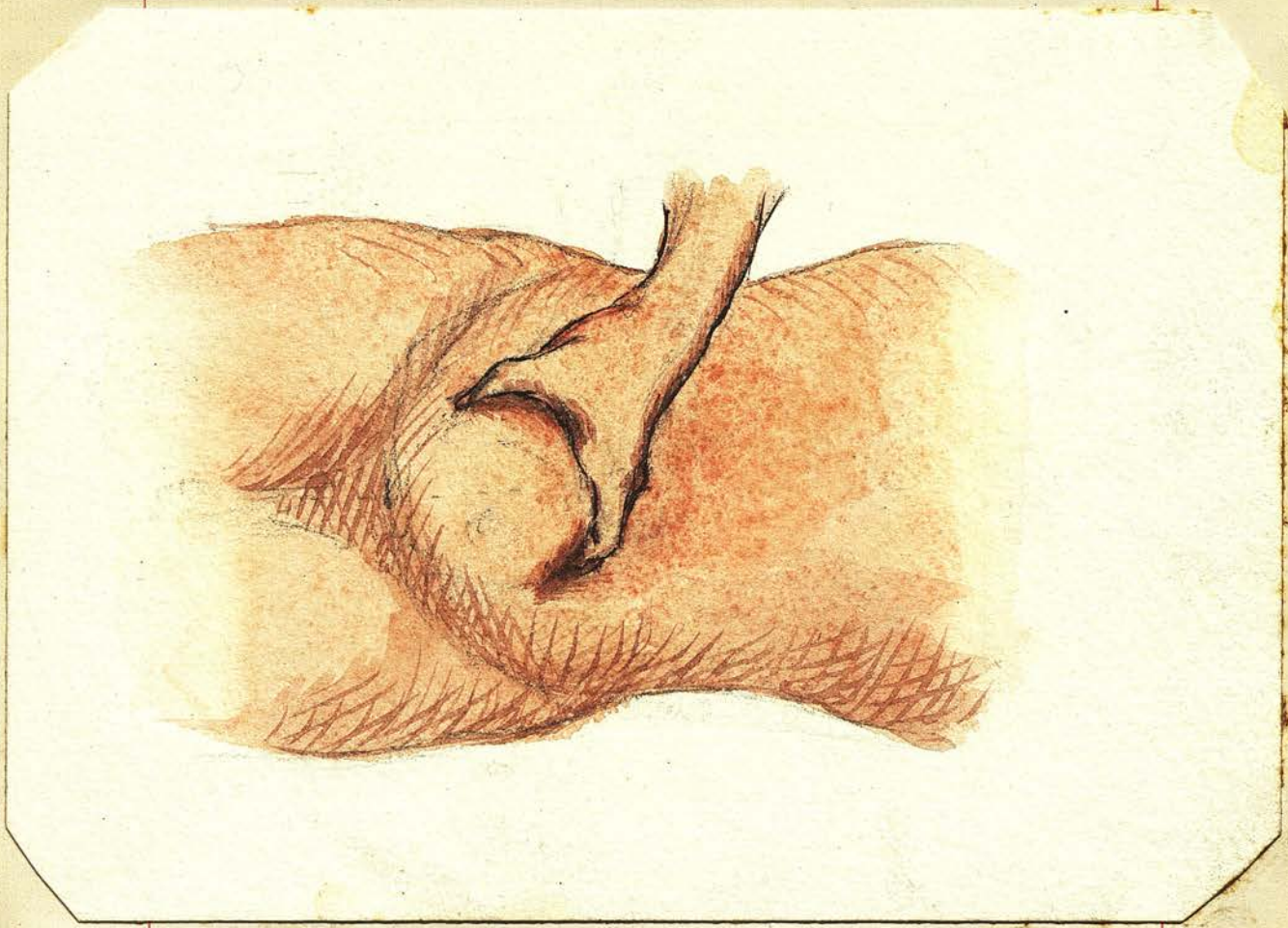

Diagram showing the natural position assumed by the hand in grasping the post-partum Uterus, when the patient is lying on her left side. Note the oblique position of the hand with regard to the pelvis. The Uterus is grasped antero-posteriorly, and the ovaries are consequently out of danger. (Haig Ferguson).

compression can safely be made without causing the patient much pain or inconvenience.

The reasons why the ovaries are not more frequently injured in the management of the third stage of labour are : -

(1) The uterus has usually been grasped obliquely as above described, though the fact has not hitherto been recognised, and has escaped observation. When a patient is lying on her left side in the usual obstetric position, it will be found that the operator's left hand involuntarily grasps the uterus in an oblique direction quâ the pelvis, and that the attempt to grasp it in an antero-posterior direction quâ the pelvis, involves a twisted and constrained position of the hand, which it would be impossible to keep up for any length of time, and would absolutely prevent the bringing into play of any degree of muscular force. Any accoucheur can prove this for himself in his daily experience. From this it will be observed, that, when the patient is lying on her left side especially, the accoucheur naturally grasps the uterus obliquely quâ the pelvis, and consequently, antero-posteriorly as regards

itself, so that the ovaries usually escape danger. Even when the patient is lying upon her back, it will be found that the hand naturally sinks into the pelvis obliquely in the same way. The common practice then, in the application of Credé's method, seems to be that the hand is not antero-posterior quâ the pelvis, but that it is antero-posterior quâ the uterus. In other words, that the safe grip of the uterus which I advocate, is the one usually employed, and that the ovaries have hitherto escaped compression more by good chance, than by good guidance.

It is just possible that, in consequence of this fortuitous circumstance, injuries to the ovaries are more apt to take place when the uterus is either not rotated at all, or where there is rotation to the left.

(2) Not infrequently, in grasping the uterus in the third stage, even a very slight pressure provokes pain, in all probability ovarian in its nature. The accoucheur in such a case, naturally changes his grip, and usually the alteration in the position of the hand relieves the patient from pain,

and enables firm compression to be made with little or no discomfort. This sufficiently accounts for Riol's observation quoted above.

The ovary also, owing to its lateral mobility, may slip away from beneath the compressing fingers, and thus escape injury, or be but slightly irritated.

In palpating the abdomen in pregnancy, the ovary is often to be felt slipping away, as it were, under the fingers.

(3) If the anterior and posterior surfaces of the uterus are well marked and easily felt, the accoucheur naturally grasps it antero-posteriorly, and alters its position to suit his hand. Sometimes the ovaries can be felt, and thus one is enabled to avoid them.

(4) It must be remembered that, in many cases, the employment of the hand through the abdominal wall, is simply a precautionary measure for the purpose of detecting and preventing relaxation of the uterus. In these circumstances no great pressure is requisite, and the ovaries, even though touched, are consequently not endangered by too great pressure. Spiegelberg mentions that when compression of the

uterus requires to be forcibly done, it is often very painful. This, however, does not require to be done very frequently, he remarks, if the third stage be managed properly, and time is given for the natural separation of the placenta to be effected.

Possible injuries to the ovaries during the compression of the third stage, must not, however be left to the determining influence of practically accidental circumstances, but the accoucheur should have a clear idea, that if he grasp the uterus in a certain way, he will, as far as it is possible to do so, avoid coming in contact with the ovaries. He will, I think, succeed in doing this in most cases, by practising the oblique grasp which I have described.

If a patient should complain of severe pain during the manipulation of the post-partum uterus, one should always fear that the ovaries are being compressed at the same time. It depends on the temperament of the patient, to a great extent, as well as on the amount of bruising to which the ovaries are subjected, whether the symptoms produced by compression of the ovaries will be severe

or not. True, it is not often that such alarming reflex symptoms occur, as were observed in the three cases which I have recorded, yet there can be no doubt that the ovaries should, as far as possible, be guarded from all sources of irritation, and that every care should be taken to prevent their being injured during the third stage of labour, and immediately post-partum. The injury inflicted on the ovary may not be, and seldom is, so great as to produce shock, but may it not, (and I merely throw out this as a suggestion), account perhaps in some measure for some of the low forms of inflammation, and other pathological conditions, so frequently met with in the ovaries, as a result of the puerperal state?

The ovaries undoubtedly run greater risk of being injured in the hands of those who "Credé" the uterus on no special principle, without regard to the axis of the pelvis, and who are only too glad to get the placenta squeezed out in any way, often immediately after the end of the second stage. But, it will be said , no such cases have been recorded. One however occasionally reads and hears of cases where so-called syncope has come on in the third

stage, or immediately thereafter. The uterus had been a little relaxed, and there had possibly been a slight threatening of haemorrhage. The syncope is ascribed to the trifling loss of blood, often not in excess of what one would expect in a normal labour, instead of being put down, as I think in many cases it should be, to the energetic and forcible kneading which the ovaries along with the uterus have been subjected to, in the over-zealous but well-meaning efforts of the accoucheur to avert a more or less visionary post-partum haemorrhage; the so-called syncope being the result of shock, pure and simple.

Since communicating a paper on this subject to the Edinburgh Obstetrical Society about a year ago, I have had several opportunities of convincing myself, that unless care be taken, the ovaries may undergo considerable bruising during the management of the third stage, and I have had some unsolicited testimony from several experienced and well-known practitioners, who after seeing my paper, not only have recalled similar cases, but have been enabled to verify the observation since, by confirmatory

evidence.

There is only one condition, so far as I know, where the post-partum uterus, should, if possible, be grasped laterally through the abdominal walls, and that is in the operation for washing out its cavity. The lateral grasp is for the purpose of compressing the Fallopian tubes in order to prevent any of the fluid from passing through the tubes into the abdominal cavity. The compression in such cases requires only to be very gentle, so that there is little fear of injuring the ovaries.

OTHER CAUSES OF POST-PARTUM SHOCK.

Shock may, of course, come on post-partum, under other circumstances.

(1) A tedious and unusually painful labour is said sometimes to account for it, especially if there be much instrumental interference. The nervous system after a severe labour is depressed by pain, starvation, and loss of sleep. Barnes records a case of shock and sudden death ten hours after labour. There was maniacal excitement in the first stage. Delivery was effected easily with forceps under chloroform. There was no post-mortem, and

Barnes ascribes the death to "Nervous shock, which "manifested itself before labour, and which was in- "tensified subsequently."

This condition is to be diagnosed from the syncope which sometimes supervenes on the sudden emptying of a largely distended uterus. As a consequence of this sudden lowering of the intra-abdominal pressure, there is dilatation of the abdominal veins, followed by temporary anaemia of the brain.

(2) Inversio Uteri, occurring post-partum may also cause shock. It can always be easily diagnosed. It is often brought about by improper and over-forcible compression of the uterus in the attempts to express the placenta.

(3) Rupture of the Uterus usually shocks the unfortunate patient, before death puts an end to her sufferings.

In one case which I heard of where pregnancy was complicated with an ovarian tumour, soon after the accession of labour pains, the patient became insensible and manifested all the symptoms of severe shock. On opening the abdomen, a fissure was found in the peritoneum covering the side of

of the uterus, which seemed to account for the condition.

(4) Injections into the uterine cavity after labour, are sometimes followed by an alarming condition of shock. This happens rarely. It is probably caused by some of the fluid regurgitating through one or both Fallopian tubes. Now it is impossible that the mere entrance of an antiseptic lotion, (or even pure water, as I have once seen) into the peritoneal cavity can account for the condition, seeing that in abdominal operations, the abdominal cavity can with impunity, and great advantage, be washed out with a lotion of similar strength. Simmons records a case where most alarming nervous symptoms followed in a case where he injected with plain water, and he quotes a case of Späth's, where shock occurred followed by death in 74 hours, after the injection of a solution of acetate of lead into the vagina. The post-mortem showed, in addition to peritonitis, a sediment of sulphate of lead on the peritoneal surface of the ovaries.

The shock in such cases is, I believe, due to the reflex irritation produced by the sudden dilatation

of the tubes by hydrostatic pressure, owing to insufficient care having been taken to provide for the reflux of the lotion through the cervix and vagina. It is not at all necessary for the production of this form of shock, that the fluid should pass into the peritoneal cavity at all. It is not peritoneal irritation which causes the shock, it is tubal distension, and this tubal distension produces a feeling of the most intense anguish. Such cases are, of course, quite different from the form of shock which was once so common, when it was the fashion to inject strong acids, and chemicals into a non-pregnant uterus in the treatment of certain conditions. The fluids injected were intensely irritating in themselves, and they were never injected in sufficient quantity to distend the tubes. They produced shock by their direct chemical action on the tubal mucous membrane, and this was shortly followed by intense inflammation and peritonitis.

SPONTANEOUS POST-PARTUM PAIN IN THE REGION OF THE OVARIES.

In contra-distinction to those cases we

have been considering of what one may call provoked ovarian pain, during pregnancy and post-partum, I would, in conclusion, refer to the condition of spontaneous pain which women may sometimes feel in the region of the ovaries at such times, but especially post-partum, in the first 24 hours of the puerperium.

Stoltz remarks "that it often happens that a "pregnant woman complains of vague pains, or of "fixed painful points near the fundus of the uterus, "for instance, on one side or the other." These pains "are generally fugitive, or are only felt in certain "attitudes, and are then not of a grave character. "It is generally difficult to assign to them a rational cause, and a precise seat." Chaignot has likewise observed similar cases, and he believes that they are produced by compression of the ovary, which only takes place during certain movements. For example, in one patient, during the last fortnight of pregnancy, he distinctly palpated the left ovary, and elicited pain on pressure. The patient experienced exactly the same pain, localised to the same spot, whenever she stooped or lay in a certain position.

Chaignot is of opinion that spontaneous ovarian pain like the above is most likely to be produced during labour, especially in primiparae with firm abdominal walls, but that it is usually masked by labour pains. He thinks that it is only in the conditions which he mentions that spontaneous ovarian pain can occur.

Budin has noticed the spontaneous ovarian pain, as described by Chaignot, only once during labour.

The case which I am about to record is, however, of a totally different nature. The pain, situated in the ovarian regions, did not manifest itself till the early puerperium, when there were no labour pains to mask it. The ovaries were not subjected to any compression between the uterus and the pelvic or abdominal walls, as the patient lay on her back during the whole time, and any slight change of position did not modify the pain in the least. No similar case has, so far as I know, been recorded. The patient was one of Dr. Croom's, and for liberty to give the following notes of the case, I am indebted to his kindness.

The case is as follows : -

Mrs.M., primipara, after normal pregnancy and labour, was delivered of a male foetus at full term. Her uterus contracted normally, and an hour after delivery she was left quite well. Shortly afterwards (about 1½ hours after the completion of labour), violent pain set in, irregular and spasmodic in its character, and accompanied by vomiting. The pain was localised to either side of the uterus, that organ itself being unaffected; it was thoroughly well contracted and painless.

During the persistence of the pain, the patient was pale, cold, somewhat collapsed, with a weak pulse, and bathed in a cold clammy perspiration. The condition persisted for about fifteen to twenty minutes, the pains recurring during that time with violence every 30 or 40 seconds. Between the acute exacerbations of the pain, and at intervals varying from three to four minutes, the patient's colour returned, the pulse improved, and the pain ceased. The same sequence of events occurred every 3 or 4 minutes for nearly 20 minutes, and then, without any medication whatever, there was complete cessation.

The condition was at the time supposed to be an attempt on the part of the uterus to pass a clot, because the only other causes of post-partum pain in a primipara were absent, viz:- metritis, and retained portion of placenta. There was, however, no clot to pass. On the cessation of the pain, the patient was quite well, and took nourishment and stimulants freely. Twenty minutes afterwards a similar train of symptoms developed themselves, but with greater violence, the pain and collapse being so great, that an unusually large dose of morphia had to be administered (a quarter of a grain every quarter of an hour till one and a half grains were reached), and not till then did she get relief from the persistent double-sided pelvic pain. After this the pain ceased, and the patient remained in a drowsy condition for two hours. There was then a recurrence of the double-sided pain, accompanied by faintness and shock to such an extent, that a hypodermic injection of ether was administered.

During all this time, the uterus remained firmly contracted, and there was no haemorrhage whatever.

A similar sequence of events, though gradually diminishing in intensity, occurred for the following

24 hours, at somewhat irregular intervals. At no time was there any increase in the temperature whatever. The patient was apparently well during the interval between the attacks, but during their persistence she was pale, collapsed, with weak pulse, and the pain distinctly localised to the region of the ovaries on either side. Vomiting occurred only with the first and second attacks, but on each occasion it was so severe, as to suggest some grave intestinal lesion.

During all this time, it is to be noted, the patient lay upon her back.

In this patient's second confinement there was no post-partum pain to speak of, and she never at any time complained of pain during either of her pregnancies.

Though such a case as this is comparatively rare, yet, in a minor degree, similar pains can be frequently recognised post-partum, quite distinct from ordinary after pains, though I have no doubt the two often co-exist.

There are three possible explanations as to the mode of origin of this pain. There can be no

doubt, from its character, that it is associated with muscular contraction, and that, altogether outside of the uterus.

(1) It may be due to compression of the ovary by the contractions of the hypertrophied muscular fibres in the ovarian ligament. These fibres are inserted into the tunica albuginea of the ovary at its internal extremity, and along the whole extent of its inferior border. Irregular spasmodic contraction of these fibres, one could reasonably suppose, might so compress portions of the ovary as to cause pain.

(2) The muscular fibres in the stroma of the ovary itself, if hypertrophied in pregnancy and contracting spasmodically, might also account for the pain. But we have no definite evidence that these muscular fibres hypertrophy to such an extent as to enable us to assume that their contraction could produce such an effect. It is possible, however, that, in certain cases, such may be the case, and that there is a veritable involution of the ovary in the same way as the uterus and Fallopian tubes involute, owing to muscular contraction

diminishing the supply of blood.

(3) The pain may possibly not originate in the ovary at all, but have its seat in the Fallopian tubes. We have seen how the muscular fibres of the tubes hypertrophy in pregnancy, and how in rabbits, complete involution takes place in less than twelve days (see Thomson's table), so that painful spasm might in some circumstances be reasonably supposed to occur during the process. We know that in certain inflammatory conditions of the tubes, great pain is experienced (usually pre-menstrual); might not the contraction of the hypertrophied muscular fibres, give rise to a similar pain in the congested tubes of pregnancy in certain conditions?

I think that this spontaneous post-partum pain most likely arises from the compression of the congested and tender ovaries by the spasmodic contraction of the hypertrophied muscular fibres in the ovarian ligament, which surround and are inserted into them.

Fischer has observed great pain and shock resulting from the spastic contraction of the cremaster on an inflamed testicle. The two conditions seem to me very much analagous.

CONCLUSIONS.

As a result of the foregoing statements, the following conclusions can , I think, be safely made:-

I. The uterus, even in the unimpregnated condition, is usually rotated on its longitudinal axis. This rotation becomes much increased in the later months of pregnancy, and during labour. In the third stage of labour, and immediately post-partum, the transverse axis of the uterus corresponds to the oblique diameter of the pelvis.

II. In the immense majority of cases, this rotation is to the right. The fact that the presenting part of the foetus usually lies in the right oblique diameter of the pelvis is probably due in great measure to this uterine rotation.

III. The ovaries in pregnancy are in close contact with the lateral walls of the uterus.

IV. The uterine rotation consequently causes one ovary (usually the left) to lie forwards towards the middle line, and the other (usually the right), to move backwards.

V. The ovaries have a rich ganglionic nervous supply, derived chiefly from the sympathetic system.

VI. The ovaries are enlarged during pregnancy; they are congested, and even slight pressure upon them, when palpated through the abdominal walls, gives rise to pain.

VII. Any strong irritation of the peripheral sensitive nerves, or of the sympathetic nerves, is capable of engendering a series of constitutional phenomena collectively known as "shock".

VIII. There is a certain class of cases where, after labour, alarming manifestations of nervous prostration and insensibility supervene, and where there is neither haemorrhage, nor any of the other recognised causes of such a condition to account for it.

IX. These cases are accounted for, by injuries inflicted on one or both ovaries in the management of the third stage of labour. During the necessary manipulations at this period, the ovaries run the risk of being bruised between the compressing hand and the hard uterus; or

the uterus is forcibly tilted over in such a way that the anterior (left) ovary is squeezed between it and the brim of the pelvis.

X. In such cases, the patients always complain of great pain, and the more forcible the compression, the greater the pain, and the better marked are the reflex manifestations, amounting in certain cases to the production of shock. Such consequences are always better seen in patients of a somewhat neurotic tendency.

XI. Analogies are to be found : - (1) in cases of abdominal section for the removal of the ovaries, when if these organs be much bruised in the process, symptoms of shock at once show themselves; and (2) in the shock which so frequently results from injuries to the testicles.

XII. In order to avoid injuring the ovaries during the management of the third stage, the uterus must be grasped antero-posteriorly, and it must be kept in mind that antero-posterior quâ the pelvis, and antero-posterior qua the uterus are not synonymous terms.

XIII. If the hand be passed into the pelvis antero-posteriorly, the ovaries are apt to be included in the grasp. The hand must therefore be placed obliquely in the pelvis, and then it will grasp the uterus antero-posteriorly. When much force is necessary, special care must at the same time be taken to press the uterus in the proper axis of the pelvis.

XIV. When the patient is lying on her left side, the operator's left hand naturally sinks into the pelvis obliquely, and so the ovaries escape danger.

XV. If a patient should complain of much pain during the manipulation of the uterus in the third stage of labour, one should fear that the ovaries are being compressed, and the grasp of the uterus should be changed.

XVI. It is often difficult to tell in the third stage of labour and immediately post-partum, which is the anterior and which is the posterior surface of the uterus, as at these times it frequently presents a somewhat globular shape.

XVII. The only condition in which the post-partum uterus should be grasped laterally, is in the operation for washing out its cavity. The grasp in such a case requires only to be very gentle.

XVIII. Post-partum shock may be due to other causes besides injury to the ovaries.

XIX. Ovarian pain may occur spontaneously after labour.

XX. This spontaneous post-partum ovarian pain is to be carefully distinguished from ordinary after-pains, or the pain which results from inflammatory affections.

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Bibliography.

Auvard. Travaux d'Obstétrique. T iii. p. 223

" Traité pratique d' Accouchements. 1889 p. 75.

Aeby. Ueber glatte Muskelfasern im Ovarium und Mesovarium von Wirbelthieren.
Arch: für Anat: und Phys: 1859. S. 675
and
Arch: für Anat: und Phys: 1861.

Ahlfeld. Einige Vorschläge zur Methodik der vergleichenden Untersuchungen über den Werth der Credé'schen Methode, etc.
Cent: für Gyn: 1886. X - 841 - 845.

Börner. Ueber den puerperalen Uterus.
Graz. 1875.

Barbour. Anatomy of Labour. Edin: 1889.
Atlas of Anatomy of Labour.

" Anatomy of Pregnancy & Labour.
Proy: Coll: Phys: Edin: Lab: Rep: Vol. ii. 1890.

" The Third Stage of Labour.
Trans: Obstet: Soc: Edin: Vol. xiii. p. 55.

Budin. Obstétrique et Gynécologie. Recherches Cliniques et Expérimentales. Paris. 1886.
p. 383.

Bandl. Ueber das Verhalten des Uterus und Cervise in der Schwangerschaft und während der Geburt.
Arch: für Gyn. XII. S. 334.
" Ueber die Normal Lage etc. des Uterus.
Arch: für Gyn: 1884. B. XXII. H. 3. S 408.
Beck. Nerves of Pregnant Uterus.
Lancet II. 1856.
Balfour. Structure of Ovary.
Quarterly Journ: Microscop: Science: Oct: 1878.
Braune. Atlas of Topographical Anatomy.
Brunton. (Lauder). Pharmacology, Materia Medica and Therapeutics.
Ballantyne. Mitral Stenosis in Labour, etc.
Trans: Edin: Obstet: Society.
Vol. XIII. p. 16.
Brown. Sequard. On Nervous Shock.
Holmes System of Surgery Vol. II. p. 207.
Barnes. Sudden Death during Labour.
Brit: Med: Journ: 1866. p. 345.
Burger. Ueber die Behandlung der III Geburtsperiode.
München. 1889.
Bischoff. Etudes sur la théorie de la Menstruation et de la fécondation.

Arch: de Med: 1854. p. 545.

Bayer. Morphologie der Gebärmutter, etc.
Fremds Gynäkologische Klinik. Strassburg. 1885.

Benekiser und Hofmeier. Beiträge zur Anatomie des schwangeren und kreissenden Uterus.
Stuttgart. 1887.

Boaart de la Faille. Monat: für Geburtskunde.
B. XXV. p. 318.

Claudius. Ueber die Lage des Uterus.
Zeitschrift f: Rat: Medicin. 1865. B. XXIII. S. 209.
Med. Times & Gazette. I. 1865. p. 5.

Croom. A Study of the Bladder during Parturition.
1884.

Credé. Beiträge zur Bestimmung der normalen Lage der gesunden Gebärmutter.
Arch: für Gyn: 1870. B. I. S. 84.

" Ueber die Zweckmässigste Methode der Entfernung der Nachgeburt.
Mon: für Geb. 1861. B. XVII. S. 274.
Arch: für Gyn: 1881. B. XVII. S. 260.

" Die Behandlung der Nachgeburt bei regelmässigen Geburten.
Arch: für Gyn: 1888. XXXII. S. 96-110

Charpentier Traité pratique des Accouchements. 1889.

Chaignot Étude sur l'exploration et la sensibilité de l'ovaire, et en particulier de la douleur ovarique chez la femme enceinte.
Thèse de Paris. 1879.

Courty. Traité pratique des maladies de l'utérus, des ovaires, et des trompes.
3me édition Paris. 1879. pp. 6, 17, 24.

Chéreau. Mémoire pour servir à l'étude des Maladies des Ovaires.
Paris. 1844. p. 137.

Cazeaux. Traité d'Accouchements.
7me édit.n. p. 56.

Charcot. Maladies du système nerveux.
(2nde édit.n) Douleur ovarique de l'hystérie
Vol. I. p. 320.

Cohn. Zur Physiologie und Diatetik der Nachgeburtsperiode.
Zeitschrift für Geb: und Gyn: B XII. H. 3.

Churchill. Diseases of Women. 1866.

Depaul. Clinique obstétricale. Paris. 1872-1876.
p. 103.

Deralz. Du varicocèle ovarien et de son influence sur le développement de l'hematocèle pélro-utérine
Thèse. Paris. 1858.

Duncan (Matthews). On the Mechanism of the Expulsion of the Placenta.
April. 1871.

Dohrn. Deutsche medicinische Wochenschrift.
1880. No: 41.

Elischer. On the Nerves of the Ovary.
Lancet. I. 1887. p. 290.

Erichsen. Handbook of Surgery, and "On Concussion of the Spine, Nervous Shock" &c
2nd Edit^n. London. 1882.

Frankenhäuser. Die Nerven der Gebärmutter.

Farre. The Uterus and its Appendages.
Supplement. Todd's Cyclop: of Anat: & Phys: p. 645.

Freund. Die Lage und Entwickelung der Beckenorgane.
Breslau. 1863.

Féré. La Douleur dite ovarienne des Hystériques a pour siège l'Ovaire.
Arch: de Neurologie. 1882. Vol: III. p. 297.

Fehling. Zur Frage der Zweckmässigsten Behandlung der Nachgeburtszeit.
Centralblatt für Gyn: 1880. B. IV. S. 586.

Fritsch. Die Lageveränderungen der Gebärmutter.
1885.

Franck. Physiology of Sympathetic System.
Dict: Encyc: des Sciences Med: 3e série. Vol. XIV. p. 1

Fischer. Ueber den Shok.
Sammlung klin: Vorte: v. Volkmann. Leipzig. 1870. No. 10

Fischer. On the third Stage.
Centralblatt f. Gynäk: 1886. No. 49.

Gaskell. Visceral Nerves.
Lancet. 1886. Vol. I. p. 934.

Groeningen und Bardeleben. Ueber den Shock.
Wiesbaden. 1885.

His. Die Lage der Eierstöcke in der weiblichen Leiche.
Arch: für Anat. und Phys: Leipzig. 1881. pp. 389-404

Hélie. Recherches sur la Disposition des fibres musculaires de l'Utérus développé par la Grossesse.
Paris. 1864.

Hasse. Beobachtungen über die Lage der Eingeweide im weiblichen Beckeneingange.
Arch: für Gyn: B. VIII. S. 402.

Hicks. Anatomy of Ovary.
Med. Times & Gaz. I. 1877.

Hart (Berry.) Topographical and Sectional Anatomy of the Female Pelvis. 1885

Hart (Berry). Note on the Mechanism of the Separation of the Placenta, etc.

Edin: Med: Journal. July. 1887.

" Improved Method of managing the third Stage of Labour.

Roy: Coll: of Phys: Lab: Rep: Vol. II. 1890.

" Mitral Stenosis and the third Stage of Labour.

Trans: Obstet: Soc: Edin: Vol. XIII. p. 9. Vol. XIV. p. 112.

Helme. Physiology of the third Stage of Labour.

Trans: Obstet: Soc: Edin: Vol. XIV. p. 14.

Hunter (John). Treatise on the Blood, Inflammation and Gunshot Wounds.

London. 1784.

Hosteing. Essai sur la Syncope.

Paris. 1877.

Hegar und Kaltenbach. Die operative Gynäkologie.

Stuttgart. 1881.

Herrieux. Traité clinique et pratique des Maladies puerpérales.

Paris. 1870. p. 371.

Homburger. Ueber die Beziehung der Stärke der Ligamenta Ro=

-kunda, etc.

Freund's Gynäkologische Klinik. B. I. S. 677.

Iastrebоff. On the Normal and Pathological Anatomy of the Ganglion Cervicale uteri.

Trans: obstet: London. 1882. XXIII. p. 125.

Jordan. (Tourneaux). Essay on Shock.

Brit: Med: Journal. 1867. Vol. I.

Joulin. Traité d'accouchements.

Paris 1867. pp. 328 to 372

Krause. (W). Specielle Anatomie. 1879.

Krause. (C. F. b.) Handbuch der menschlichen Anatomie.

Hannover. 1879. 80-81.

Kölliker. Ueber die Lage der weiblichen inneren Geschlechtsorgane.

Bonn. 1882.

Klein and Noble Smith. Atlas of Histology.

Küstner. On the axis of the uterus.

Zeitschrift für Geb: und Gyn: B. XI. S. 2.

" Beitrag zur Anatomie der Cervix Uteri.

Arch: für Gyn: B. XII. S. 383.

Klebs. Die Eierstockseier der Wirbelthiere.

Virchow's Arch: für Patholog: Anat: B. XXI.

Lusk. Text Book of Midwifery.

Lee. Anatomy of Ovary.
Med. Times & Gaz: I. 1857.
" Atlas of Nerves of Uterus.
Landois and Stirling. Text book of Human Physiology. (3rd Edition).
Lothrop. Heart failure in the Puerperium.
Tr: American Ass'n of Obstetricians & Gynecologists.
1888. Vol. I. p. 280.
Lieutaud. Anatomie historique et pratique.
Vol: II. p. 165. Note by Portal.
Lonmaigne. De la Hernie de l'ovaire.
Thèse. 1869.
Martin. (E.) Die physiologische Lage und Gestalt der schwangeren Gebärmutter bei der Lebenden.
Zeitsch: für Geburt und Frauenk: B. I. 1876. S. 389
Mc Cormack. Article "Shock".
Quain's Dict: of Medicine.
Meyer. Ueber die Entwickelung der menschlichen Eierstöcke.
Arch: für Gyn: B. XXIII. H. 2.
Mc Donald (Angus) The Bearings of Chronic Diseases of the Heart upon Pregnancy, Parturition and Childbed.
London. 1878.

Munde. Obstetric Palpation.
New York. 1880.

Murat. Dict: des Sciences Méd: 1819. T. XXXIX. p. 4.

Mc Clintock. Dublin Med: Press. 1852.

Mordret. Mémoires Acad: Méd: 1858.

Négrier. Sur les Ovaires. Paris. 1840.

Nothnagel. Handbuch der Krankheiten des Nervensystems.
in Ziemssens Sammelwerk XI. B. Leipzig. 1876.

Olshausen. Die Krankheiten der Ovarien.
Stuttgart.

Pfannkuch. Arch: für Gynäkol: III B. 3. H.

Pflüger. Untersuchen zur Anatomie und Physiologie der Eierstöcke der Säugethiere
allg: Med. Cent: Ztg: Berlin. 1862. B. XXXI
XVII. S. 713.

Puech. Des Ovaires; de leurs anomalies.
Mém: de l'Acad. de Montpélier. 1870-71.

Pirogoff. Grundzüge der allgemeinen Kriegschirurgie.
Leipzig. 1864.

Pelikan. Gerichtliche Med: Untersuchungen über den Skopzenthum in Russland.
Giessen. 1876.

Pott (Percival). Surgical Works.
Vol. I. p. 492.

Rouget. Recherches sur les organes erectiles de la femme, et l'appareil musculaire ovario-tubaire.

Journ: de la Physiologie, etc: Brown-Séquard. T. T. 1858.

" Article on Ovary in Dict: Encyclop: des Sciences méd: Vol. XVIII, Série 2me.

Ritchie. Ovarian Physiology and Pathology. 1865.

Rainy. On the Structure and Use of the Ligamenta Rotunda.

Phil: Trans: London. 1850. part. III.

Robin. Mémoires sur la Modification de la muqueuse utérine pendant et après la grossesse.

Mém: de l'Acad: de Médecine. 1861.

(at the end of this paper he speaks of the ovary).

Riol. "Delivrance par Expression". Paris. 1880

Richet. Anatomie médico-chirurgicale. 4th ed^n. p. 581.

Runge. Die Leitung der Nachgeburtsperiode. Berliner Klin: Wochenschrift: 1880. No: 44 and also in Cent: für Gynäk: 1880. No: 26.

Römer. On the third Stage. Arch: für Gynäk: B. ~~XXVIII~~. H. 2.

Swan. (Joseph). The Physiology of the Nerves of the Uterus and its Appendages.
London. 1846.

Schroeder und Stratz. Der schwangere und kreissende Uterus.
Bonn. 1886.

Spiegelberg. Text book of Midwifery.
Sydenham Soc.: 1889.

Schrön. Beitrag zur Kenntniss der Anatomie und Physiologie der Eierstöcke der Säugethiere.
Zt.: für Wissensch. Zoologie. 1863.
B. xii. p. 409.

Sappey. Traité d'Anatomie descriptive.
Paris. 1881.

Schwarz. Article on Uterus in Vol.: ~~xxxvii~~.
Nouveau Dict.: de Médecine.

Schultze (B) Zur Kenntniss von der Lage der Eingeweide im weiblichen Becken.
Arch.: für Gyn.: B. ix. S. 262.

Stricker. Handbuch der Lehre von den Geweben des Menschen und der Thiere.
Leipzig. 1872.

Schatz. Ueber die Physiologie und physiologische Behandlung der Nachgeburtsperiode.

Allg: Wien: Med: Ztg: 1886. XXXI. 549.

Simmons. On occasional danger in the use of Vaginal Injections.
American Journal of Obstetrics. 1880. Vol: XIII. p. 52.

Savory. Article on "Shock."
Holmes System of Surgery. Vol: I. p. 376.

Sinéty. (de) De l'ovaire pendant la Grossesse.
Comptes rendus de l'Acad: de Sciences. Août. 1877.

Stoltz. Article "Grossesse" du Nouveau Dict: de Médecine. T. XVII. p. 14.

Schultze. Ueber den Mechanismus der spontanen Ausscheidung der Nachgeburt, und über den Credéschen und den Dubliner Handgriff.
Deutsche Med: Wochenschrift. 1880. No: 51, 52.

Schüle. Bemerk zur Behandlung der Nachgeburtsperiode.
Mon: für Geburt. XXII. 1863. p. 15.

Schauta. On the third Stage.
Wiener Med: Blätter. 1886. No: 11 - 13.

Symington. On the Position of the Uterus and Ovaries in the Child.
Edin: Med: Journal. July. 1886.

Travers. Constitutional Irritation.
2 volumes. 1835.

Thomson (H). "Ueber Veränderungen der Tuben und Ovarien in der Schwangerschaft und im Puerperium".
unter Prof: Küstner, Dorpat. 1890.
Zeitschrift für Geb: und Gynäk: B. XVIII. H. S. 30

Tarnier et Chantreuil. Traité d'Accouchements.
Paris. 1878. p. 184 - 232.

Thiede. Ueber das Verhältniss des Cervix uteri.
Zeitsch: für Gynäk: B. IV. S. 210.

Valentin. Ueber die Entwickelung der Follikel in dem Eierstock der Säugethiere.
Müller's Arch: für Anat: und Phys: 1838. p. 526.

Verneuil. Article "Commotion"
Dict: Encyc: des Sciences méd:

Vincent. Des Causes de la Mort prompte après les grands Traumatismes accidentels chirurgicaux.
Paris. 1878.

Velpeau. Traité d'accouchements.
Vol: I. p. 169.

Williams. Physiological and Pathological Alteration in the Position of the Uterus.

Lancet. II. 1873. p.p. 192 and 298.

Waldeyer. Eierstöcke und Ei.
1870.

Wernich. On Shock.
Centr: für Gynäk: VIII. 1884. S. 170.

Winter. "Zwei Medianschnitte durch Gebärende"
Berlin. 1889.

Watson. Discussion on the intra peritoneal
Treatment of Abdominal Tumours.
Brit: Med: Journal. 1881. p. 549.

Winckel. Die Pathologie und Therapie des
Wochenbettes.
3rd Edit^n Berlin. 1878.